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VOL LXIII 12 AUGUST 1950 No 1622

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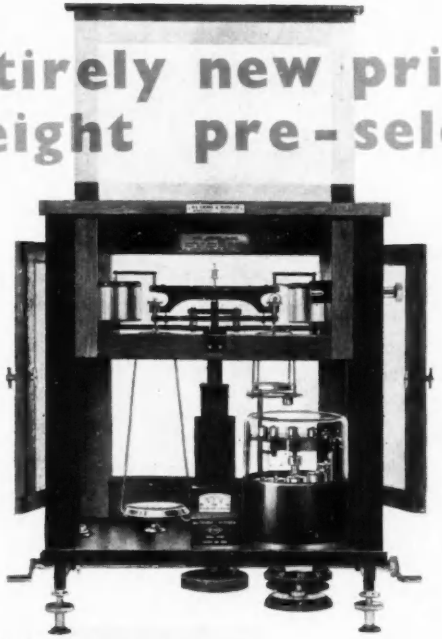

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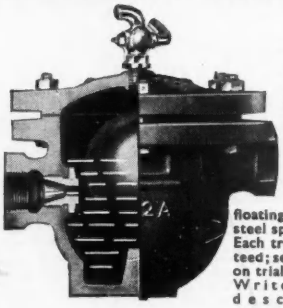

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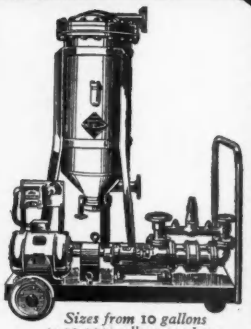

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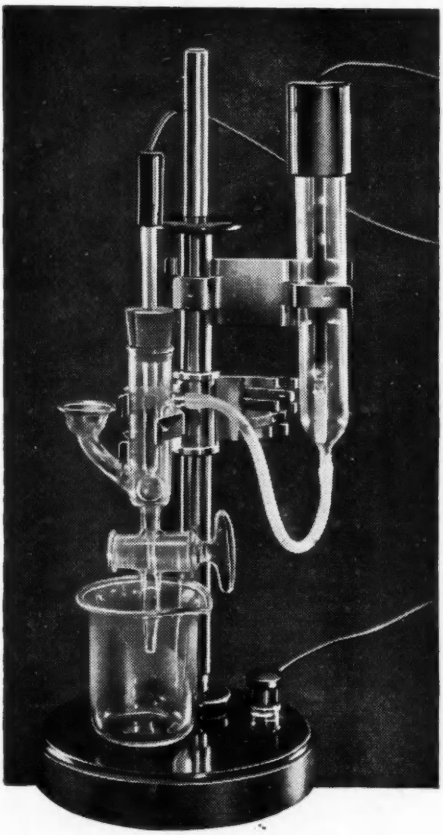

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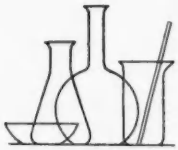

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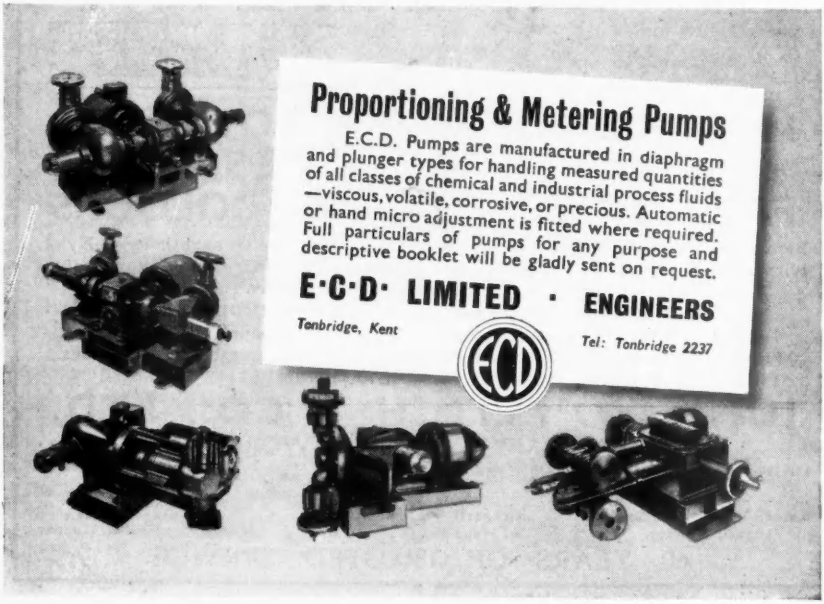
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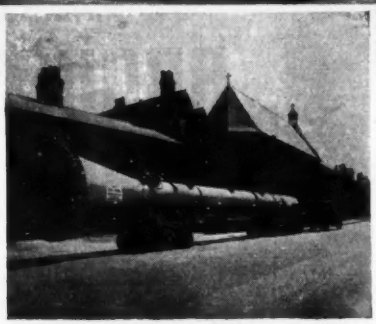

The upper illustration shows a vertical boring mill recently installed in the Widnes Machine Shop. Table 18 ft. 5 ins. in diameter with a clear height under the cross-rail of 13 ft. 11 ins. The mill is capable of machining castings up to 100 tons in weight.

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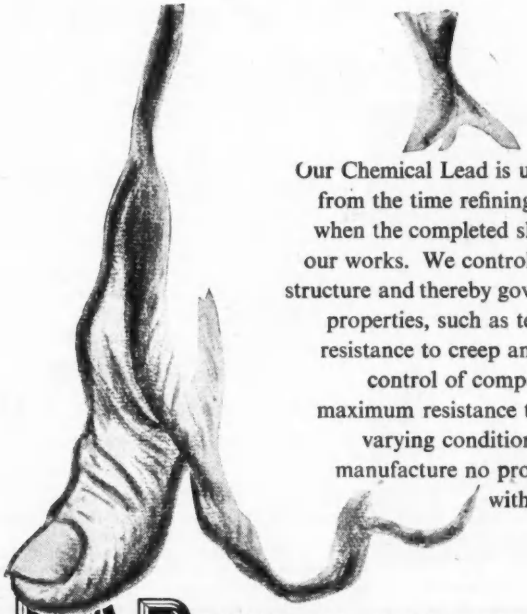

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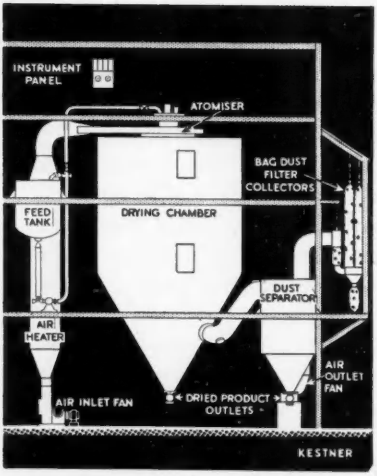

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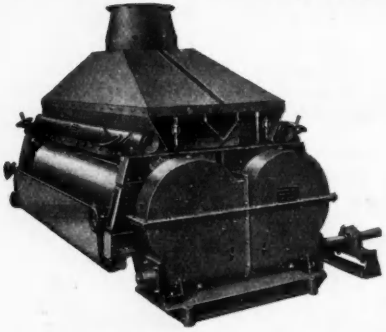

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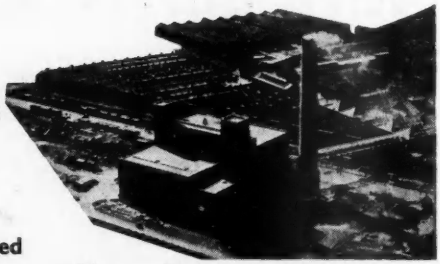

Make-up and Condensate examined at new generating station

Three separate installations of Dionic Water Purity Meters have been incorporated in the new thermal-electric generating station which Jas. Williamson & Son Ltd., the linoleum and coated fabric manufacturers, have brought into operation at Lune Mills, Lancaster.

Two Dionic meters installed in the boiler house indicate the purity of condensate returns at various sampling points, and give immediate warning of any change in conductivity. The third forms part of the water treatment plant where the River Lune water, unfit in its raw state for boiler feed purposes, is treated prior to use as make-up. Conductivity readings are taken of the treated water and also of condensate returns from process steam used in the factory.

Each Dionic meter consists of a mixing chamber with four inlets from different sampling points, a conductivity tube through which samples of the water are continually flowing, and an indicator with alarm bell. Should the conductivity at any time exceed a pre-determined figure, the alarm bell rings and the attendants take appropriate action.

Indicators for the three Dionic meters form part of the main boiler and turbine panel which carries a record of all principal measurements for the operation of the station.

Publication CH 216 carries full details of Dionic Water Purity Meters.

The Day's Work

At the works of The Rugby Portland Cement Company Limited the Evershed Recorder charts form a 'useful record of the day's working' and they check power consumption, whether plant runs to schedule, and when a machine can be put on extra duty without increasing the maximum demand.

Megger Testers in Scottish Highland Hydro-Electric Schemes

Megger Earth Testers have been 'extremely useful' in the operations of the North of Scotland Hydro-Electric Board. They are employed for testing earths being installed at the various hydro and diesel stations, for testing substation earths, and also for testing earthing systems in villages where water mains are not available as earths. The Board have also used Megger Earth Testers for carrying out specific resistivity tests along the routes of the new 132 kV and 33 kV overhead lines.

Send for Publication CH 051/20, 22 and 25.

The Experts choose Dionic Testers

When a leading manufacturer of water treatment plant chooses Dionic Purity Meters, that's a fair test. For ten years the Permutit Company Ltd. have used Dionic equipment in their experimental laboratories at Chiswick. In the Analytical Laboratory, 300 samples of raw water a month are examined with a portable Dionic instrument, which has proved extremely valuable for indicating the amount of total dissolved solids. A pilot water treatment plant has been erected for experimental purposes in the Testing Laboratory. Here the Dionic equipment comprises a permanently installed portable instrument as well as two water tube units, an indicator and triplex recorder, enabling the continuity of the processed water to be under constant examination.

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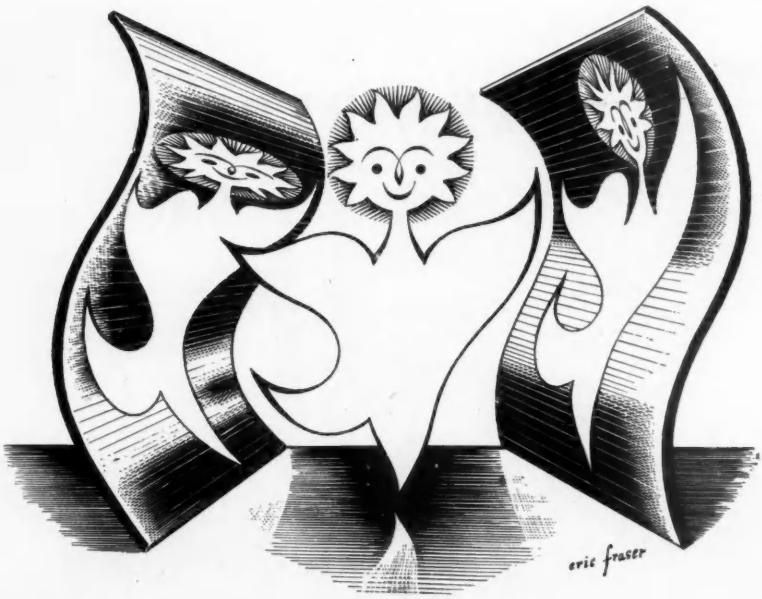

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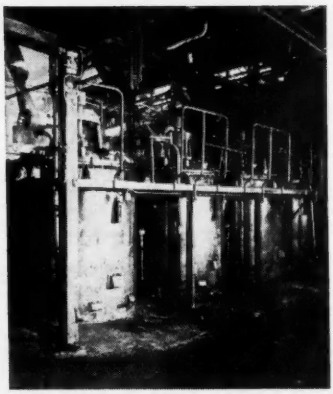

See, for instance, how compact an installation can be devised. Here is part of a battery of reaction vessels—each of 220 gallon capacity—used in the production of aniline dye at the works of Williams (Hounslow) Ltd. Town gas is used throughout for heating. The specially-designed internally insulated housings hold cast-iron pans which are enamelled inside, and fitted with belt-driven agitating mechanism

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Volume LXIII 12 August 1950 Number 1622

Synthetic Glycerin

THE economic history of glycerin is on the whole an argument against its large-scale synthesis, and for that reason the $8 million factory set up by the Shell Chemical Corporation near Houston, Texas, has unusual significance.

Glycerin has a great diversity of uses, but it has always been available, often in excess of demand, as a by-product from soap and fatty acid manufacture. As a result it has an exceedingly erratic price record. With a relatively stable production volume of some size, small fluctuations in the scale of demand have led to sharp price variations. For example, glycerin was 29 cents a pound in America in 1937 and by 1938 the price had dropped to 12 cents. This type of change is typical of the glycerin market in the years between the wars. It is believed that potential users as a chemical raw material were deterred by these abrupt and not easily predictable changes. It is certain that research investigations into the synthetic production of glycerin were held back by this factor.

When war needs set up a great additional demand for glycerin the normal supply-demand picture is distorted. Most of us have good reason to be familiar with that phenomenon. In the first world war Germany produced a fair tonnage of glycerin somewhat cumbersomely by carbohydrate fermentation; in the second world war she developed the catalytic hydrogenation of sugar to produce a mixture containing glycerin. Neither of these methods, however, could hope to find an economic place in times of peace.

In America the post-war story of glycerin has not reproduced the fluctuations experienced in 1920-1939. From 1941 to 1947 production rose by 20 per cent, a relatively small increase when compared with expansions in the same period for many other commodities. On the other hand, what was once only a minor use of glycerin has been increasing at a remarkable rate. As a raw material for plastic or synthetic resin manufacture, glycerin is in huge and rising demand. Its use for cellophane, synthetic coatings, and adhesives accounts for more than 35 per cent of the total demand. The many other uses of glycerin have remained fairly steady in volume, although some have risen In 1947 the price of glycerin had reached 40 cents a pound, but in 1949 it fell to 25 cents. This fall may not seem to agree with the picture of growing demand, but it has been attributed to two factors: first, to the lowering of

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world prices for fats and oils, and second, the introduction of synthetic glycerin.

Even when glycerin was selling at 40 cents a pound in peacetime, it seems doubtful whether a large-scale synthetic process would have been introduced had it not been thought that the demand for glycerin would continue to rise and that the tonnage capable of being produced during soap manufacture was likely to decline. The intense competition in the United States between fatty soaps and modern detergents, a battle in which soap seems to experience a fresh reverse each year, has undoubtedly been an important factor in the development of the synthetic form. It has been suggested, in fact, that the introduction of synthetic glycerin is a piece of strategy in the detergent-soap struggle. The substantial addition to glycerin supplies has led to a fall in price, which in turn raise the overall costs of soap production. The fact that detergents as well as glycerin can be produced from petroleum has not been overlooked.

The manufacture of glycerin from a petroleum starting point is said to have required 20 years of laboratory research and 10 years devoted to pilot-plant investigations. This is probably not a conservative estimate, and during much of the long development period work must have been retarded by the unfavourable economic condi- market. The basic operation is the conversion of propylene—obtained from cracking petroleum—into allyl chloride. The problem is to chlorinate an unsaturated hydrocarbon without disturbing the double-bond.

It was discovered that the required allyl chloride reaction would take place with a yield of 80 to 85 per cent if chlorination was effected at 500-600°C. and in the absence of a catalyst. Some earlier American reports have given a narrower temperature range.

The conversion of allyl chloride into glycerin is relatively simpler. Two methods are possible; the formation of allyl alcohol by hydrolysis, followed by chlorohydrination to the monochlorohydrin and further hydrolysis to glycerin; or the immediate chlorohydrination of allyl chloride to produce the dichlorohydrin of glycerin, again with hydrolysis to glycerin as the last stage. It is believed that the latter and shorter sequence is used at the Texas plant. A dilute solution of glycerin is given. This is purified by evaporation, settlement, and vacuum distillation, yielding an end-product of more than 99 per cent purity. The

(continued on page 216)

Notes and Comments

America's Fertilisers

THE hope that both countries would benefit, which was expressed when the British "productivity team" concerned with superphosphate and compound fertilisers embarked for the U.S.A. in October last, seems in the light of the newly issued report on that tour to have been more than a pious aspiration. There are several fundamental differences distinguishing the industries here and in the U.S.A., in addition to the marked advantage which American makers of superphosphate enjoy in the possession of ample supplies of indigenous sulphur for acid manufacture and the less exacting standard of available content of phosphoric acid. It is safe to predict, however, that this report (*summarised on page 217 of this issue*) will be read almost as widely as it is here and that the one or two inconsistencies observed by the British team, such as the apparent neglect to apply the highly developed system of mechanisation to the despatch of the bagged finished products will not be disregarded in America.

Machines and Large Units

THERE was no expectation in October that any fundamental changes in fertiliser practice here could emanate from the productivity team's findings, but a great opportunity will have been wasted if serious effort is not made to adopt boldly some of the American practice based upon the philosophy of "leaving it to the machine." That cannot be done without substantial new investment to provide such aids as the logical simplified layouts and the ample instrumentation and automatic control which sometimes enables one man in America to operate alone a relatively elaborate acid process. The American expedition, incidentally, underlines the productive advantages of the big undertaking over the little one. The evidence is in the proportionate increases in productivity which have been recorded every year since the war. The record in mixed fertiliser plants reads like this: small plants 8½ per cent; medium plants 13 per cent; large plants (more than 35,000 tons a year) 18 per cent. In superphosphate production small plants have actually shown a deterioration (– 11 per cent) compared with increases of up to 16 per cent achieved by the big units.

Oil and Korea

RECOLLECTIONS of the decisive rôle which petroleum played in the sort of warfare with which most of us had a more or less intimate acquaintanceship between 1939-45 has aroused some speculation as to how that factor may influence the relatively highly mechanised combat in Korea. Both sides, it seems likely, must be dependent on supplies from outside, notwithstanding that there are substantial refinery undertakings within the territory dominated by the North Korean forces. There is no oil in north or south, but there is a refinery in both territories, in the north at Gensan near Wonsan on the east coast, having rail connection with Seoul. The bombing and shelling of an enemy refinery to which there have recently been references appears to be the Gensan plant, whose importance is likely to consist in its tankage rather than its capacity as a producer. Prior to 1939 it was thought to be capable of producing some 250,000 tons a year, but in 1946 it was considered obsolete and unserviceable. Of much more practical importance is the refinery at Ulsan on on the east coast, about 50 miles northeast of Pusan, for which the South Koreans had recently allocated nearly the equivalent of U.S.$300,000 for construction, hoping to raise the productive capacity to some 240,000 tons a year. These facts have been called to mind by the *Petroleum Press Service*, which does not overlook the probability that the outcome of the struggle will not be decisively affected

by local petroleum capacities. The North Koreans' most likely bulk source is Manchuria where, in the Fushan district, oil is being produced both from coal and from shale. In the island of Sakhalin, not remote from the North Korean forces and wholly under U.S.S.R. control, is an installation thought to be producing more than 750,000 tons of refined oil yearly.

The New Coalfield

FOREIGN estimates of the capacity of British chemical industries seldom omit to note the senescence and prospect of dwindling returns from United Kingdom coalfields. How unreliable is the conventional view about coalfields and yields has now been emphasised again by news of a "strike"—fortunately in the geological connotation of the term—about a mile south-east of Rugeley. It points to the existence of possibly 200 million tons of high quality coal lying in seams up to 10 ft. in depth at comfortable mining levels. The deepest is said to be about 1800 ft. underground and there are thought to be very substantial reserves much more accessible. This, it will be noted, is not an isolated occurrence; it is in fact anything but the exception proving the rule that Britain's coal reserves are worked out. It appears, on the contrary, to be the fulfilment of what was suspected when the Geological Survey of Great Britain early last year revealed the existence of at least 400 million tons of workable coal around Whittington Heath, near Lichfield, Staffordshire. It would be difficult to overestimate the prospective value of this potential addition of mineral wealth, the source of a diversity of chemicals and of the energy required to process them, which relatively few neighbouring countries can reproduce. The only condition attaching to this substantial gift towards economic recovery is that miners and the National Coal Board should have the good sense to bring this new coal to the trucks clean and at a price industries can afford to pay.

RSA Award for Invention

WHAT is the worth of "an entirely new and outstanding contribution to the national economic recovery"? To say that the Royal Society of Arts assesses it at £500 and a gold medal is probably not strictly true, although those are the prizes it intends to confer on May 1 next year on whoever has succeeded in doing what our statesmen have signally failed to do. The RSA, in the past patron and godfather of many historic advances in the arts and practical sciences, certainly looks for something much more tangible and productive than a currency adjustment or a groundnuts scheme in reviving its ancient practice of offering money prizes to the inventive. Concluding that nothing at the moment looms larger than food supplies, the society has stipulated that the invention shall be "a means of promoting the production or the economic utilisation of food in Britain". Thus the RSA has joined forces with multiplicity of influences which from many standpoints are all directed to the same purpose. The common denominator is that chemistry enters into most of the fields concerned. Intending entrants may take heart in the knowledge that the man who gave agriculture superphosphate, Sir John Bennet Lawes, is no longer a possible rival and that the patent rights attaching to the winning invention may well yield several hundred times as much as the prize money.

SYNTHETIC GLYCERIN

(*continued from page* 214)

plant is said to have a capacity of 3 million pounds per month in an installation in which nickel and nickel alloys have overcome the ever present corrosion problems.

All these considerations might seem remote from United Kingdom chemical economics, but for two new facts. Glycerin in bulk now costs £40 per ton more and this country will shortly possess the most advanced plant for large scale petroleum refining.

Chemical Industries: 1948, 63, *3*, 374-375.
and 1950, 66, *2*, 177.
W. D. Mogerman, *Discovery*, 1950, 11, *7*, 209-210.

U.S. FERTILISER PRACTICE

Productivity Team Recommends Some Changes Here

IN factory lay-out and in its wide use of mechanical handling and advanced distribution methods the U.S. fertiliser industries have some substantial advantages not shared by their counterparts in this country. These are among the principal findings of the productivity team from the fertiliser industry which returned to this country some months ago after an extended tour, under the auspices of the Anglo-American Council on Productivity, of American fertiliser plants.

The team says in its report* that in America the industry has developed on rather different lines from the industry in this country. In America it has many natural advantages. Notably it does not depend on imports for any of its raw materials and unlimited land has been available cheaply for the erection of its factories, so that it has been possible to follow "straight line" single block design in building.

Agricultural Research Stations

In recent years the American Government has been actively concerned in retrieving the consequences of poor farming practice and the Tennessee Valley Authority, which it created, has developed many new fertiliser materials on a commercial scale. At the same time Government recognition has been responsible, in collaboration with the industry, for the establishment in every State of agricultural research stations. To educate the farmer in the correct and adequate use of fertilisers, to improve crop yields and soil fertility, advisory services on a large scale have also been established.

Because of the vast area of the U.S.A., freight charges have played a large part in the economy of the fertiliser industry. Great attention has been given to the increase in plant food content of fertilisers and development of concentrated types has progressed much faster than in Britain. The development is illustrated by the wide use in compound manufacture of concentrated nitrogen liquors and cyanamide, which cannot be applied in Britain as they would cause the reversion of water soluble phosphates. New types of nitrogeneous fertilisers are becoming popular because of their slower acting properties.

The average plant food content of commercial fertiliser has risen gradually from 18.1 per cent in 1930 to over 20 per per cent, an increase of nearly 13 per cent, and in some compound fertilisers is as high as 28 per cent. It is estimated that this increase has made a saving to farmers of at least $5 million a year in freight charges.

Triple Superphosphate

New records for the production of triple superphosphate have been established and new plants are being brought into production. The report questions whether the saving in distribution expenses in this country would counterbalance the higher manufacturing costs.

Intensive research into soil deficiencies having revealed the need for a number of secondary plant food and trace elements, there has been a demand in certain areas for special mixtures containing these materials. Other recent developments are the use of anhydrous ammonia for direct injection into the soil, mostly on pasture land, the introduction of nitrogenous liquors into irrigation water and the production of freshly mixed fertilisers of granular and large crystalline raw materials for spreading directly on the land by vehicles filled at the factory.

Factory Layout

The layout of the factories visited was superior in design to all but the most modern of British works. The team comments on the wide use of mobile handling equipment and (though there was nothing new in conveying and elevating equipment) the extensive use of shuttle conveyors, eliminating ploughs and throwoffs when sticky material was being handled. Mobile handling equipment facilitated production at much higher rates than are common in Britain.

The report incorporates a general survey of the American fertiliser industry, a description of its factories, its process methods and its manufacturing and handling equipment. Other chapters discuss production, labour, and organisation and administration.

It notes that some American factories are offering a service which comprises a mixing to farmers' own formulæ and bulk spreading on the fields. The transporting

* "Superphosphate and Compound Fertilizers," from the Anglo-American Council on Productivity, 21 Tothill Street, London, S.W.1. or from the Fertilizer Manufacturers' Association, Ltd., 44, Russell Square, London, W.C.1. (3s.)

and spreading vehicles, which are either owned by the factory or hired, cannot compete with normal vehicles on haulage alone. They can therefore only be economically operated within a limited radius from the mixing plant.

Among the team's recommendations for action here, to implement some of the successful principles seen in the U.S.A. are these:—

A national survey of soil fertility.

Adoption of the available phosphoric acid standard for fertilisers in preference to the water soluble standard as soon as possible.

There should be an expansion of free exchange of all information designed to increase productivity within the industry.

Propaganda to encourage the correct and wider use of fertiliser.

Continued restriction in the interests of production and economy of the number of different mixtures produced.

Investigation of the possibility of bulk distribution and spreading of granular fertiliser in one operation.

Investigation by the railway authorities of the possibility of increased provision of bottom discharge wagons, in view of the rapidly increasing quantities of bulk material transported by rail.

Technical Recommendations

In the light of its observations of U.S. manufacturing processes the team has produced a large number of technical recommendations. It proposes:—

Centralisation of controls in new or reconstructed acid plants to economise manpower.

The use of simple mechanical devices, such as drag line scrapers, for the rapid discharge of bulk material from railway wagon and of mechanical handling equipment to reduce human effort.

The payment of higher hourly rates for skilled process operations in preference to piece work or bonus rates, except on wholly repetitive work, to raise the status of the skilled worker and encourage individual ambition. Encouragement to workers to take an interest in their factory's production.

The team has also recommended several changes in working conditions:

The supplementing of safety measures by propaganda to make workers safety conscious. Good washing and changing conditions to help maintain the morale of the workers. Provision of refreshments by automatic machines. Simplification of reporting procedure and more mechanised office equipment.

Owing to different methods of measurement of efficiencies the Report states that accurate figures on man-hours per ton were difficult to obtain, but it gives these conclusions:

American practice in acid manufacture is slightly better than British, mainly because of the widespread use of sulphur as a raw material. Centralisation of controls, however, is a contributory factor.

Superphosphate manufacture is greater in America than in Britain. Only British modern continuous processes approach American performance, mainly because of high hourly throughput.

In compound manufacture, packing and dispatch, American processes derive a substantial advantage from the use of mobile equipment for recovery of materials from stock pile to mixing and packing plants.

The handling and storing of raw materials in the two countries is not strictly comparable because of the different layout of American factories and the use of large capacity railway wagons. These two factors give considerable advantages to the Americans.

The average basic rate of pay in the industry appeared high at $1.10 an hour. The range was from the minimum of 60 cents under Federal law to $2.00. Although the cost of living in America is much higher than in Britain, the average American worker has approximately 17 per cent more of his earnings available for non-essentials than the British worker.

Industrial Casualties

NUMBERS of deaths from industrial accidents in the U.K. reported in June disclose an increase over the previous month and over the same period of last year. The total in June was 129 against 103 in May and 116 in June 1949.

In industries concerned with chemicals, oils, soaps, etc., there were only three deaths (one less than in May); metal extracting and refining accounted for one; metal conversion and founding, four; and other metal trades, one; textile manufacture and textile printing, bleaching and dyeing accounted for three.

No deaths were reported from industrial diseases in June under the Factories Act. 1937, or under the Lead Paint (Protection Against Poisoning) Act, 1926. The total number of cases reported, as shown in the *Ministry of Labour Gazette*, was 42, one more than in May. Four were due to lead poisoning; two to anthrax; skin cancer (epithetiomatous ulceration) accounted for 21 (pitch, nine; tar, 12); and chrome ulceration 15 (manufacture of bichromates, seven; chromium plating, eight).

MORE SULPHURIC ACID

Higher Production and Consumption in Second Quarter

DETAILS of production, consumption and stocks of sulphuric acid and oleum in the second quarter of this year, issued by the National Sulphuric Acid Association, Ltd., are given in the tables below. The total production of chamber and contact acid (461,025 tons) represented an increase of 11,940 tons over the January to March quarter. Consumption was also slightly higher than in the previous quarter, the figures being 464,203 tons against 461,094 tons. Increased use by individual industries was particularly marked in oil refining and petroleum products, 15,070 tons (14,886); paint and lithopone, 34,943 (32,006); rayon and transparent paper, 57,772 (57,001); agricultural purposes 1676 (139); bichromate and chromic acid, 3101 (2862); bromine, 3253 (2646).

PRODUCTION OF SULPHURIC ACID AND OLEUM

(Tons of 100% H_2SO_4)

	Chamber only	Contact only	Chamber and Contact
Stock, Apr. 1, 1950 ...	28,666	29,290	57,956
Production	176,955	284,070	461,025
Receipts	52,421	13,803	66,224
Oleum feed	—	1,868	1,868
Adjustments	—24	—102	—126
Use	108,289	113,890	222,179
Despatches	121,996	184,327	306,323
Stock, June 30, 1950 ...	27,733	30,712	58,445
Total capacity represented	202,300	292,860	495,160
Percentage production	87.5%	97.0%	93.1%

CONSUMPTION—UNITED KINGDOM

(Tons of 100% H_2SO_4)

Trade Uses	
Accumulators	2,319
Agricultural purposes	1,676
Bichromate and chromic acid	3,101
Bromine	3,253
Clays (fuller's earth, etc.)	2,691
Copper pickling	592
Dealers	4,975
Drugs and fine chemicals	2,966
Dyestuffs and intermediates	20,771
Explosives	4,167
Export	978
Glue, gelatine and size	137
Hydrochloric acid	16,950
Hydrofluoric acid	2,221
Iron pickling (incl. tin plate)	24,914
Leather	1,894
Metal extraction	596
Oil refining and petroleum products	15,070
Oil (vegetable)	2,123
Paint and lithopone	34,943
Paper, etc.	1,103
Phosphates (industrial)	1,161
Plastics, not otherwise classified	5,186
Rayon and transparent paper	57,772
Sewage	2,800
Soap and glycerin	3,866
Sugar refining	150
Sulphate of ammonia	65,678
Sulphates of copper, nickel, etc.	6,353
Sulphate of magnesium	1,404
Superphosphates	122,626
Tar and benzole	4,620
Textile uses	6,041
Borax and boracic acid ...	Included in Unclassified below
Chlorsulphonic acid	
Formic acid	
Oxalic, tartaric and citric acids	
Phenol (synthetic)	
Rare earths	
Sulphate of alumina	
Sulphate of barium	
Sulphate of zinc	
Unclassified :—	39,106
Total	464,203

RAW MATERIALS

(Tons)

	Pyrites	Spent Oxide	Sulphur & H_2S	Zinc Concentrates	Anhydrite
Stock, Apr. 1, 1950 ...	67,619	182,434	61,127	24,915	730
Receipts ...	54,048	55,806	109,711	45,198	49,366
Adjustments ...	+724	—1,069	—79	—184	—
Use	54,567	47,304	91,622	43,587	49,261
Despatches ...	945	4,344	476	933	—
		266*			
Stock, June 30, 1950 ...	66,879	185,257	78,661	25,409	835

* Used at works for purposes other than sulphuric acid manufacture.

Health Service Prescriptions

A REPORT has been published by the Ministry of Health, which gives guidance to doctors in the Health Service in deciding in borderline cases what preparations should be regarded as toilet requisites and therefore should not be prescribed free. The report will be of interest to the manufacturers and producers of the chemicals they contain.

Examples of items not to be prescribed are given as astringent lotions, bath salts, cold creams, face powders, hair tonics, hand creams, shampoos, shaving creams, soaps, and styptics, skin lotions, soaps, tooth pastes, powders, talcum powders, vanishing cream. The report also recommends that certain proprietary preparations for which prophylactic and therapeutic claims are made should not normally be prescribed if they may be used for routine toilet purposes. Included among those quoted are anti-midge and barrier creams and medicated soaps.

LABORATORY TRAINING

Replacement of Physicists' Certificate

THE Board of the Institute of Physics has announced that the Institute's certificate in laboratory arts will not be awarded after 1951, in view of the establishment of the intermediate certificate for laboratory technicians by the City and Guilds of London Institute, which it welcomes.

During his presidential remarks in 1932 Lord Rutherford had suggested that the Institute should do something to promote the welfare of technical research assistants. The board, believing that the success of many physicists' work greatly depended on the skill of these men, actively pursued this suggestion.

The first step was to make available proper courses of training, success in which should lead to a widely recognised certificate. With the co-operation of various colleges the Institute's scheme was adopted in 1934 and the standard of successful candidates has been commendably high.

For some time a need has been felt for a certificate which would be of value to technicians in a wider range of laboratories. After consultation, the City and Guilds of London Institute agreed in 1949 to set up an exploratory committee on which the Institute of Physics was represented to suggest suitable conditions and syllabuses for such an award. The work of this committee has resulted in the publication of regulations and syllabuses which come into operation in the session 1950-51.

The City and Guilds of London Institute has agreed that holders of the Institute of Physics certificate shall be eligible to enter the course for the advanced laboratory technicians certificate, to be established shortly on the same terms as the new intermediate certificate. This is regarded as a fitting recognition of the standard which the Institute of Physics certificate holders had reached and of the pioneer work which that certificate represented. Students who have already begun courses for the Institute of Physics certificate will be able to complete these by 1951, after which the Institute of Physics will no longer examine in laboratory arts.

The board of the Institute has formally recorded its appreciation of the important work of those who have established and taught the course for its certificate and hopes that their work will be continued under the new scheme.

B.A. PAPERS

Diverse Topics at Birmingham

A LARGE number of items in the programme of the 112th annual meeting of the British Association for the Advancement of Science, to be held in Birmingham from August 30 to September 6 inclusive, are associated with the subject of the presidential address on Man's Use of Energy, which Sir Harold Hartley will give at the inaugural general meeting at 8.30 p.m. on Wednesday, August 30, in the Town Hall, Birmingham.

Section B (Chemistry) addresses and papers, to be given in the main building, large chemistry theatre, University of Birmingham, will include the following:—

Thursday, August 31.—Sectional presidential address by Professor E. L. Hirst on modern developments in carbohydrate chemistry. Papers: "Seaweed Polysaccharides," by Dr. E. G. V. Percival; "The Enzymes Associated with Starch Metabolism," by Professor S. Peat.

Friday, September 1.—Papers on the chemistry of plastics, rubber and fibres: "The Degradation of High Polymers," by Professor H. W. Melville; "Physico-Chemical Methods in the Study of Fibre Formation from Synthetic Polymers," by Dr. F. Happey; "Natural and Synthetic Rubbers—a Comparison," by Mr. A. E. T. Neale; "Structural Characteristics Which Determine Plastics, Rubber and Fibres," by Mr. G. Dring and Dr. R. F. Hunter. Colour film, "The Future of Plastics."

Monday, September 4.—Papers on chromatography: "Some Recent Developments in Chromatography," by Dr. T. I. Williams; "Partition Chromatography, with particular reference to Amino Acids," by Dr. C. E. Dent; "Inorganic Chromatography on Cellulose," by Dr. F. H. Pollard. Films on chromatographic and microchemical techniques.

Tuesday, September 5.—Papers on chemical energy: "Chemical Energy of Combustion Reactions," by Professor F. H. Garner; "Chemical Energy of Reactions other than Combustion," by Dr. James Taylor; "Direct Conversion of Chemical Energy to Electrical Energy," by Dr. H. J. T. Ellingham; "The Building Up of Chemical Energy," by Professor F. G. Gregory.

Wednesday, September 6.—Papers on chemistry of muscular contraction: Introduction by Professor E. Baldwin; "Adenosinetriphosphate and the Isolated Myofibril," by Dr. S. V. Perry; "Shortening of Muscle During *Rigor Mortis*," by Dr. J. R. Bendall.

There is a B sectional reception and tea, by invitation of the Midland Chemists' Committee, planned to take place at 4 p.m. on Wednesday, August 30, in the sectional committee rooms of the Birmingham University. A number of visits to chemical and other works have been arranged.

Autumn Metals Meeting

The Institute of Metals is to hold its 42nd annual autumn meeting at Bournemouth from September 18-22. The scientific and technical sessions will start on September 19. The autumn lecture is to be given by Mr. E. E. Schumacher, chief metallurgist of the Bell Telephone Laboratories, New Jersey, U.S.A.

ALKALI INSPECTORS' REPORT

Prevention of Noxious Fumes and Gases

THE widening scope of the work carried out by the chief inspectors in encouraging or enforcing the observance of the requirements of the Alkali, etc., Works Regulation Act and associated legislation is well illustrated in the 86th annual report (for 1949) on alkali, etc., works (HMSO, 1s. net).

The number of works registered under the Act in 1949 was 969, involving the operation of 1741 separate processes. Compared with the previous year, this shows a reduction of 14 works and 25 processes, but the diminution relates mainly to by-products of the coal carbonisation industry and follows the trend which has been apparent for several years. From the details given, however, it is apparent that the complexity of the work involved in the maintenance of effective precautionary measures against the emission of smoke, fumes and noxious matter generally has increased. This is indicated by the fact that of the 3752 visits paid by alkali inspectors during the year 378 were in connection with works not registered under the Alkali Act.

Among the many special cases described in the report, a large number involving emission of smoke and fumes were effectively dealt with by raising the height of the existing factory chimneys. In a number of cases the installation of more modern plant was advised and duly carried out. In one of these, a lamp black works, an improvement was effected by the installation of the latest means of dust collecting.

Offending Smells

The difficulty of dealing with some of the complaints of works emissions was, as usual, increased by the vague descriptions given to the inspectors of offending smells, etc. This was exemplified by complaints over a wide area of "a strong smell of tomcats."

The cause of the trouble was eventually traced to the operation of an oil additive process. This had been operated for two years and the gases had been burnt during that time in an incinerator without causing offence. A slight change in technique had, however, been made, and this apparently had caused the production of a mercaptan type of gaseous compound which was highly odoriferous and, not being entirely destroyed in the incinerator, could be detected several miles away.

Reversion was made to the earlier process, the combustion of the foul gas was abandoned and caustic soda scrubbing instituted in its place as a temporary expedient. These measures were effective but they are to be regarded as temporary expedients and it will be necessary to establish a permanent solution of what the inspectors' report describes as "this very tricky problem."

Among the many problems with which the inspectors were faced in connection with the emission of fluorine compounds, one which has not yet been brought to a satisfactory conclusion occurred in a factory used for the manufacture of vitreous enamel frits. Compaint had been made of symptoms of fluorosis in cattle grazing on pastures close to these works.

High Altitude Discharges

The enamel glass or frit was made by melting a complex mixture which frequently contained a proportion of fluorine-bearing materials, *e.g.*, cryolite, fluorspar or sodium silico-fluoride. It was estimated that about 10 per cent of the fluorine was evolved in the melting process, but this point has not yet been reliably established. In some other cases of fluorine emissions investigated, the inspectors were left in some doubt as to whether mere discharge at a high altitude provides a sufficient solution.

Investigations at chemical manure works revealed that there have been a number of welcome improvements to scrubbing systems associated with works employing superphosphate processes, and there have also been fewer infractions of the regulations. This has been reflected in a lower average acidity of escaping gases, the comparative figures being 0.088 grains per cu. ft. in 1949 against 0.12 in 1948 and 0.15 in 1947.

The few cases at chemical manure works of infraction of the rules were usually the result of a temporary deficiency of water supply to the scrubber or other abnormal circumstances, and did not warrant prosecution.

In a review of the chemical industry generally, the report offers the opinion that there is reason to anticipate that the high rates of production in 1949 will at least be maintained during the current year.

DEVELOPING TIN USES

Report of the Tin Research Institute

WORK on the alteration and extension of its buildings at Greenford somewhat modified the research programme of the Tin Research Institute during 1949.

The institute's report indicates that research work on tinplate has been concentrated upon improvements in the methods of quality control. Equipment has been designed and will shortly be available for assessing the importance of variables in manufacturing conditions on the corrosion-resistance of tinplate.

New Testing Machines

Further work on factors affecting the life of tin-base bearing metals was put in hand and two new testing machines will be in operation when the laboratory is restored to use.

The possibilities of obtaining new bearing materials by powder metallurgy were examined as this method may give a combination of properties not obtainable by ordinary casting methods.

Some work has been done on the antifrictional properties of the aluminium-tin alloys, which may provide an attractive alternative to materials hitherto available, due in part to the cheapness (for its bulk) of aluminium.

Intensive technical service has been given to bronze founders with a view to improving the production of commercial bronzes. A machine for the semi-continuous casting of bronze has been designed and is under construction.

Electrodeposition of tin from the stannous fluoborate bath has been under investigation and work on the deposition of tin-lead alloys started. New electrolytes have been designed and examined which may offer advantages in the electrodeposition of tin. Mechanisms to test these with rapidly moving cathodes are being prepared.

Work on electro-deposited tin alloys has been prosecuted actively and the use of these alloys in industry is gaining ground. Tin-copper, tin-zinc, tin-lead are already widely accepted. Tin-cadmium has aroused interest as a rust-resisting coating and other alloys of considerable interest and importance are being developed.

The policy of placing certain investigations with other organisations with special facilities has been extended. The work at Fulmer Research Institute on the metallurgical properties of the aluminium-tin alloys has produced a series of valuable alloys. At Birmingham University work on the sand-casting of bronze showed great promise and fundamental investigations of the theory of tin alloys has been initiated.

Work has also been arranged at Delft University on the application of tin oxide in vitreous enamels and at Utrecht University on organo-tin compounds.

Extra-Mural Work

Numerous other researches were going on in collaboration with laboratories at various universities, Government establishments and industrial organisations on problems of common interest.

More time was devoted to technical service overseas and to the production of up-to-date practical publications, which now cover all major applications of tin.

Methods for improving the resistance of tinplate to rusting and sulphur staining are discussed by R. A. Gillies (chief chemist, Brand & Co., Ltd., London) and illustrated with colour photographs in the same issue of "Tin and Its Uses" (No. 22) which reviews the activities of the International Tin Study Group.

U.S. Metal Powder Standards

TWO new standards have been issued by the Metal Powder Association, New York City. The first is a glossary of terms used in powder metallurgy (MPA Standard 9-50T—Tentative Definitions of Terms Used in Powder Metallurgy). The second (MPA Standard 10-50T—Tentative Standard Tension Test Specimens for Pressed and Sintered Metal Powders) specifies a flat tension specimen and a round machined tension specimen to be used in determinations of the tensile characteristics of pressed and sintered metal powders.

U.S. Titanium Production

A NEW and jointly-owned company to produce titanium metal and its alloys has been formed by the Remington Arms Company, Inc., of Bridgeport, Connecticut, and the Crucible Steel Company of America, New York. The new company will have complete access to the knowledge, patents and manufacturing techniques developed by the parent companies for the production of sheets, rods, tubes, wire, forgings, castings and other fabricated forms of the metal. It plans to maintain a full-scale research programme.

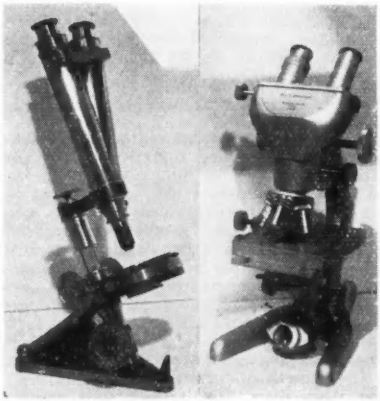
ANALYTICAL CHEMISTRY at the SCIENCE MUSEUM

From A CORRESPONDENT

IT will be some time before the chemistry collections at the Science Museum can be restored to their former state, since the rebuilding operations which have closed the galleries they occupy are not yet complete. A token collection has been on view for some time, but during this month and the early part of September a small special exhibition has been arranged, which had its origin in a suggestion made in connection with the Summer School in Analytical Chemistry which is being given at Imperial College in September by the Royal Institute of Chemistry (London and South Eastern Counties Section).

A small display of new apparatus, it was thought, might benefit members of the school, but the idea was extended and eventually the project was transformed into an exhibition suitable for the general public. It has been arranged by the Science Museum, with the co-operation of the organisers.

The exhibition does not attempt the task of presenting the whole history and present practice of analytical chemistry in four or five cases. Instead it aims to show the average museum visitor that analytical chemistry is a diverse and colourful subject, that its history is not its least interesting aspect and that it is possible to discern two main lines of development: the progress from macro to micro scale, and the introduction of physical methods.



Pasteur's microscope and its modern analytical equivalent

The comparison between the reproduction of the organic analysis apparatus used by Berzelius in 1814 with the Pregl organic analysis train first introduced in 1912 bears a label which shows that the search for methods of reducing the scale of operations is nothing new. Berzelius was successful in reducing his scale from that of ordinary preparative chemistry to that of gram quantities. A corresponding relative reduction in scale did not take place for a long time although there was a constant refinement of technique over the course of the century between Berzelius and Pregl.

Precursors

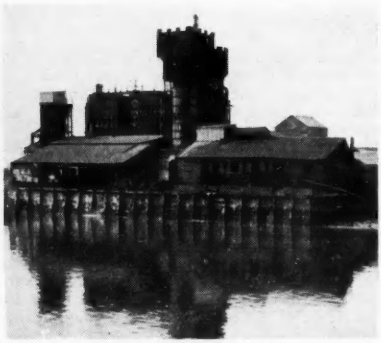
The normal laboratory equipment of the chemist has seen steady progress, exemplified here by some simple comparisons. An analytical balance of the early nineteenth century is set side by side with its 1950 counterpart. With the balances go volumetric glassware, dated 1830, 1870 and 1950. The 1830 example is a burette which belonged to Gay-Lussac, who was the founder and originator of the whole technique of volumetric analysis, a fact not generally appreciated.

Modern methods are treated in two cases, the first of which shows in simple form the principles of chromatography; an absorptiometer with the parts linked up to a diagram of the optical system; a recording polarograph which has been arranged by the maker to run continuously and provide a trace of the curve for a simple two metal solution over and over again throughout the day; and two microscopes. These tell their own story, one being the microscope which was bought by Whitbreads, the brewers, for Pasteur to use when he visited England in 1873, and the other one of the latest examples of a modern instrument.

Nearby is a new instrument based on an observation made by Faraday in 1850. The position of a freely suspended magnetic ball between the poles of a magnet will alter if a paramagnetic gas is introduced into the field region. All odd-

(*continued at foot of next page*)

A Kentish Cradle of Chemical Industry



The sulphuric acid plant at Queenborough

"BEING at Queenborrowe Castle in the yeare 1579, I found there, one Matthias Falconer, a Brabander, who did, in a furnace that he had erected there, trie to drawe very goode brimstone and copperas oute of a certaine stone that is gathered in great plenty upon the shoure, neare untoe Minster in this Isle."

This extract, quoted in Lambert's "Perambulations of Kent," is believed to be the oldest known record of any chemical works in Britain. Possibly the manufacture of chemicals may have been undertaken in this country at an even earlier date, but the unique interest of this authentic record lies in the existence today of a modern chemical works, established on the very site where—nearly 400 years ago—Matthais Falconer, the Fleming, erected his furnaces and made sulphuric acid from the sulphur contents of pyrites gathered from the cliffs and beach at Sheppey and made sulphate of iron from the burnt ashes from the furnace.

Not many years ago reconstruction of the foundations of the present sulphuric acid plant led to the discovery of the old pits in which the copperas was made. During the intervening centuries many other processes have been employed on the same site for the manufacture of various chemical products.

It was during the latter part of the 19th century that the late William Carr Stevens founded the company known as the Sheppey Glue & Chemical Works, Ltd., which, apart from the link with Matthias Falconer, has a history going back more than 100 years. As far back as 1847 William Carr Stevens, and before him his father, made organic fertilisers by dissolving bones with acid at their works at Bow Common, London. So successful was this venture that eventually the Bow Common works became too small to cope with the demand for these fertilisers, and for this reason the Queenborough site was purchased in 1886.

The manufacture of sulphuric acid and glue is still undertaken on the site formerly occupied by the furnaces of Matthias Fleming, but the degreasing of bones for the glue process was established on the second Sheppey site. The latest type of superphosphate den has been erected on this site, where the manufacture of superphosphate, compound fertilisers, organic and inorganic fertilisers is carried on in buildings that cover several acres.

ANALYTICAL CHEMISTRY AT THE SCIENCE MUSEUM

(continued from previous page)

electron molecules are paramagnetic—NO, NO_2 are examples—but the most important one is oxygen, which although having an even number of electrons is believed to contain two with unshared spins. It thus becomes possible to measure the oxygen content of a gas continuously by observing its effect on a magnetic system.

Two entirely new departures occupy another case. Radiochemistry and tracer technique have been possibilities ever since the idea of isotopes was first put forward. Only since the supply of isotopes was put on a general distribution basis has it been possible for the radioactive tracer technique to become a daily tool of the research worker.

The essential points are brought out in this exhibit. Radiochemical methods can detect and estimate smaller amounts of material than any other, and the equipment used is simple in principle if complicated in actual execution.

The other new technique is microbiological assay. Actual cultures are used to outline the principles of the way in which substances are estimated by their effects on the growth of bacteria or moulds.

Finally, there is a display of microanalytical apparatus made in the laboratories of some of London's technical colleges.

CHEMISTS' SERVICE IN FIRE RESEARCH

Practical Studies of Combustibles and Suppressors

by A. G. THOMSON

THE highly inflammable liquids used in modern industry present special fire risks the control of which presents a wide and varied field for chemical research. The chemist is also associated with many other aspects of fire protection such as the phenomena of ignition and combustion, the use of various chemicals as extinguishing agents, the effectiveness of wetting agents, etc. In many ways the chemist is making a major contribution to the science of fire prevention and extinction.

Before the establishment of the Chemistry Section with the newly formed Joint Fire Research Organisation at Boreham Wood, the fire research programme was developed by a team under Dr. J. H. Burgoyne in Professor Sir Alfred Egerton's department at the Imperial College of Science and Technology, London.

Continuing investigations started during the war, the spontaneous heating of palm kernels stored in jute sacks has been studied.

Self-heating in the materials of the palm kernel stack was investigated under controlled laboratory conditions. The moistened materials were enclosed in an adiabatic reaction vessel, through which a slow stream of saturated air was passed. The effluent gas was analysed and measurements were made of the rate of oxygen absorption, evolution of carbon dioxide and heat evolution. The materials examined included palm kernels, both clean and contaminated jute bag fabric and a mixture of palm kernels and contaminated bag fibres. Only in the case of the palm kernels was there any indication of a reaction likely to raise the temperature above some 75° C., the maximum value which could be accounted for by biological activity.

Cause of Self Heating

It was considered, therefore, that self-heating above 75° C. was probably due to causes other than biological activity, and was most readily explained by normal chemical oxidation of the original materials or of the products derived from them by previous biological reactions. The former possibility was examined both by studying the kinetics of the reaction between oil extracted from jute bags used for the storage of palm kernels and oxygen at temperatures of 80° C. or higher and also by determination of the evolution of heat during the course of the reaction.

In general, it was found that, given an adequate supply of moisture, microbiological heating might occur in palm kernel stacks with a consequent rise in temperature up to 60-75° C. If a stack is laid down in the standard manner using only dry bags of kernels, is protected against water, and is subject only to the normal atmospheric conditions prevailing at the London Dock, the relative humidity of the air in the stack is unlikely to be high enough for a sufficient time for significant microbiological heating to occur. At temperatures above that at which microbiological action would be expected, independent exothermic chemical reactions might occur.

An interim report of these investigations was included in "Fire Research 1948" and a review of the data obtained is being prepared for publication.

Fire Hazards in Wool

Oils are used in the woollen industry to facilitate the processing of wool. While wool itself is less inflammable than many other textile fibres, the addition of oil may be expected to increase the fire hazard. The oils formerly used for this purpose were mainly neutral vegetable oils and oleines. In recent years considerations of cost and supply have led to the substitution of mineral oils. At the request of the Fire Offices' Committee the Joint Fire Research Organisation undertook an investigation to develop a simple means of assessing the relative hazard of the various oils employed under the conditions of use.

During a preliminary survey of represen- various oils particular attention was given to ease of ignition as measured by the flash-point, and by ignition tests with small igniting sources. The next step was to see how the rate of flame spread on oiled wool was influenced by these properties and by the amount of oil present. A close parallel was observed between the results of the laboratory tests and the rates of burning of oils on a measured length of horizontal asbestos cord.

The spontaneous combustion of oils and seeds is being investigated by the following method. A weighed quantity of oil is

applied to a fibre, which is surrounded by a bath of boiling water. The rise in temperature is then measured against time. If an oil is not liable to spontaneous heating the temperature will not exceed 100°. Active oils show a more rapid temperature response.

When wood is heated it decomposes at a rate which becomes extremely rapid at about 275° C., and at temperatures somewhat lower than this ignition will take place in the presence of a pilot flame. There is also a widely held theory that if wood is heated for a long time at a temperature considerably below its ignition temperature, it is converted into a highly active form of charcoal which ignites spontaneously in air at temperatures well below the ignition temperature of the original wood. This has a direct bearing on the recognised hazard presented by woodwork in close proximity to heating appliances, hot water pipes, exhausts, etc.

Effect of Pre-heating

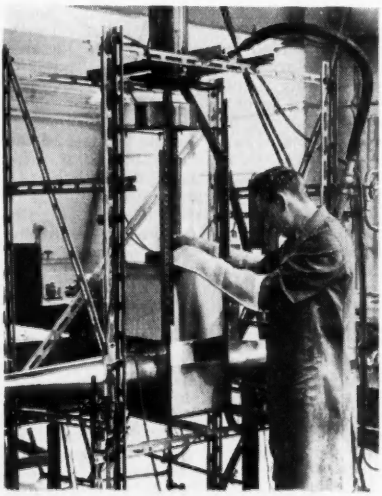
Both sawdust and 1 cm. cubes of wood have been investigated in an apparatus designed to determine the effect of preheating on ignition temperature. The specimen is preheated in a thermostatically controlled oven for periods ranging from a week to several months. The ignition temperature of a sample is then determined, either in oxygen or air. The ignition temperature of the preheated wood has proved to be lower than that of normally dried wood, but not sufficiently low to permit ignition by steam pipes.

This investigation will be extended in the near future by preheating wood in an inert atmosphere and then determining the ignition temperature.

Fires in liquid storage installations present a special hazard. Attention is being given to the inhibition of the combustion of vapour of certain pure compounds by the addition of a volatile inhibitor in the liquid phase. In these conditions the effectiveness of the inhibitor depends not only on its capacity to prevent flame propagation when present in the vapour phase, but also on the relative volatilities of combustible and inhibitor which determine the concentrations in the vapour phase.

It is possible by selecting an inhibitor with a much greater vapour pressure than a particular liquid fuel, to produce such a mixture that the vapour in equilibrium with the mixture is non-inflammable although the vapour of the same composition as the liquid phase would be inflammable. This presents a possible method of protecting liquid fuel installations.

Aviation spirit and aviation kerosene were selected as examples of their respective classes of fuels and also as being likely to present the greatest practical difficulties. The effects of various inhibitors have been studied, including methyl bromide, methyl iodide, dichlorodifluoromethane, chlorotrifluoromethane and sulphur hexafluoride. The results of the experiments suggested that this method of protection was not practicable for aviation spirit with the inhibitors at present available, and of doubtful practicability for kerosene.



Investigating the effect of droplet size on the extinction of oil fires

Comparison of Inhibitors

The effects of such inhibitors as methyl bromide and carbon tetrachloride on liquid fuels and explosive atmospheres are still being studied. The objects of this investigation are to compare the efficiencies of various inhibitors and also to determine their quantitative effects, in order to obtain the necessary data for applications both in the open and in closed rooms, such as transformer houses.

A constant flow apparatus is being used at present for this investigation. The combustible gas, air and inhibitor are mixed in the desired quantities and allowed to flow through the apparatus until the air has been displaced. The mixture is then tested by a gas flame at the bottom of the tube. If the mixture is

within the explosive limits, a flame will be propagated up the tube. The limit of inflammability is reached when the flame just fails to ignite the gas mixture. Typical combustibles used are coal gas, hexane and petrol.

The application of water sprays to the extinction of oil fires is being investigated by means of an apparatus capable of producing sprays of known droplet size, which permits both the size of the drops and the rate of delivery to be varied.

The oil used for this experiment is kerosene, which floats on water in a brass pot. Over the pot is a chimney which is covered with long sliding panels to form an asbestos box. Air is admitted through two side arms and circulates through holes in the bottom of the chimney.

Method of Spray

The spray consists of a number of hypodermic needles fitted to a brass plate and is located at the top of the chimney. Water is allowed to flow through the needles from a cylinder above the spray. Each needle is fitted with a nipple which allows a blast of air to be blown vertically downwards past the needle. The rate of flow can be altered by varying the air pressures in the cylinder and the droplet sizes by varying the air flow past the ends of the needles.

The kerosene is ignited and allowed to burn for a short time. The spray is then applied to the fire for a measured period, during which the fire is smothered. The purpose of the investigation is to determine the most effective droplet size and rate of flow for extinguishing oil fires. The results so far obtained indicate that very large droplets tend to accelerate the rate of burning, due to agitation of the kerosene. At the other extreme, there is evidence that with smaller droplets the rate of burning decreases both with decreasing droplet size and with increasing rate of water flow.

Foam Compounds

During the war, a test to compare the efficiency of different foam compounds in extinguishing petrol fires was developed at the Chemical Research Laboratory by Dr. N. O. Clark. This test is based on the ratio of the rate of coverage of petrol by foam to the rate of consumption of the foam blanket by fire.

The Joint Fire Research Organisation has developed a controllable apparatus for the continuous production of foam on a small scale, thereby facilitating the examination of foam compounds and the qualities of foams produced with them.

Investigating the time taken to destroy foam blankets

In the latest apparatus petrol contained in a metal tray has a rectangular free surface measuring 42 in. by 8 in. Foam having a known shear strength and a known expansion factor is fed from a compressed air foam generator down a chute and on to the petrol surface, and the rate of coverage of the petrol is observed. An 8-in. length of the foam blanket is then removed from the tray at the end farthest from the chute, the exposed petrol is ignited, and the time taken to destroy a further 8-in. length of the blanket is observed. The end point of the process is indicated by the ringing of an electric bell operated by a fusible link placed in the foam.

Other Investigations

Several special investigations involving work on foam compounds have been undertaken. One of these was designed to examine the possibility of diluting normal foam compounds for the purpose of producing the low viscosity type of compound required in some RAF crash tenders. A method developed jointly by the Fire Research Organisation and the Chemical Research Laboratory proved to be satisfactory.

Experiments were made during the war at the Forest Products Research Laboratory on the addition of chemicals to water used for fire fighting. This investigation is being continued by the Joint Fire Research Organisation. It is considered improbable that wetting agents will give any advantage in fire extinction, which is largely a matter of cooling. By ensuring an even distribution of the liquids applied to unburnt materials, however, they may assist in the prevention of spread of fire.

A NEW PLASTICISER

Potential Replacement for Dibutyl Phthalate

THE recent emergence of dicapryl phthalate, a light-coloured high boiling ester having all the desirable properties of the well known plasticiser, dibutyl phthalate, may prove to be of considerable importance to plastics manufacturers.

While it corresponds closely with the dibutyl ester, it has not the latter's volatility, which has always proved a limiting factor in its application, particularly during the mixing, milling and calendering of vinyl compounds.

Generally, the plasticising efficiency of dicapryl phthalate is equivalent to that of dioctyl phthalate but the former gives superior heat stability.

Dicapryl phthalate is a clear, pale amber coloured liquid possessing a slight fruit-like odour. It boils at 229° C. at 4.5 mm. and freezes at −60° C.; flash point is 395° F. and fire point 440° F. The liquid tends to thicken at −20° C. but does not crystallise at −60° C. It is a very viscous gel at this temperature. Dicapryl phthalate is less than 0.03 per cent soluble and the solubility of water in the ester at the same temperature is less than 0.15 per cent.

Solvents for dicapryl phthalate are acetone; methyl hexyl ketone; ethyl ether; ethyl cellosolve, ethylene dichloride; mineral spirits; benzene; xylol; ethyl alcohol and butyl alcohol. The saponification number of the plasticiser is 277-287 (mgm. KOH per gm. of plasticiser) and the acid number is less than 0.22.

Compatibility

Dicapryl phthalate ester is compatible with a large number of common plastics. including polyvinyl chloride, acetate and copolymers; nitrocellulose; ethyl cellulose; polyvinyl butyral; alkyd resins; synthetic rubbers and natural rubber and certain types of acrylic esters. It is particularly suitable for polyvinyl chloride and copolymers and in the U.S.A. it finds wide use in fabric-coating compositions and extruded vinyl stocks when low temperature flexibility and low volatility are required.

Dicapryl phthalate has the additional advantages of being economical in yielding stocks with good water resistance, fair oil resistance and flame-resisting properties.

Among the principal attractions of dicapryl phthalate to the plastics manufacturer are these:—

1. It is widely compatible with vinyl resins and several other plastics.

2. Its high plasticiser efficiency (as measured by 100 per cent modulus) is equivalent to that of dioctyl phthalate.

3. The slight sacrifice in colour is fully compensated by the fact that dicapryl phthalate has a higher boiling point than dioctyl phthalate and a lower volatility. In addition, it has better ageing properties and greater heat stability. Tests carried out by the Rohm & Haas Company (which has pioneered the development of dicapryl phthalate in the U.S.A.) show that stocks containing this plasticiser exhibit less discolouration and embrittlement after seven hours at 150°C. than do dioctyl phthalate stocks after 3.5 hours at the same temperature.

4. Stocks containing dicapryl phthalate exhibit very low extraction by solvents; 100 octane petrol and aromatic fuel have no effect at all on plasticised vinyl resin and mineral oil gives an extraction loss of 9.2 per cent weight change—against 9 per cent for dioctyl phthalate. This figure, although much higher than that obtained by use of polyester type plasticisers is considerably lower than the percentage shown for the sebacates.

5. Dicapryl phthalate is non-corrosive, possesses no objectionable smell and its use does not introduce any serious hazards in the way of toxicity and dermatitis risks.

The availability of dicapryl phthalate to the plastics industry seems likely to enlarge considerably the scope and usefulness of the phthalates. When used alone or in conjunction with other esters this phthalate should prove a very acceptable material for manufacturers of vinyl resin goods, particularly calendered stock and extruded goods.

Statistical Methods Conference

The Industrial Applications Section of the Royal Statistical Society is organising a conference at Sheffield University on scientific method in industrial production, at which technicians and managements of manufacturing concerns will be able to meet statisticians interested in industrial problems. The conference will continue from 2.30 p.m. on September 29 to the afternoon of Sunday, October 1.

WIDENING USES OF CHROMATOGRAPHY

An Outline of Possibilites in Industry

BASICALLY, chromatography is a tool for the separation of complex mixtures and it owes its usefulness partly to the fact that it is highly specific in separating even closely related substances and partly to its universal applicability to a very wide range of products and problems.

This is the theme of a brief report dealing with "Chromatography in Industrial Research", published by Mactaggart and Evans, Ltd., Sondes Place Research Institute, Dorking.

The report considers the most striking achievements have been in investigations involving naturally-occurring substances such as vitamins, hormones, natural pigments and antibiotics.

One of the great difficulties associated with this kind of work is that the substances which are of interest often occur in nature in exceedingly low concentrations and consequently solvent extraction produces, of necessity, very dilute solutions. The simplest use of chromatographic methods is for concentrating solutions obtained in this way. If the dilute solution is passed through a column of suitable absorbent, the substance sought can subsequently be eluted with a small amount of a suitable solvent to give a relatively strong solution.

A more important use of chromatography in research on these problems is the separation of complex mixtures. The older methods of fractional distillation and crystallisation presuppose some knowledge of the nature and characteristics of the components of the mixture to be separated.

Preliminary Examination Unnecessary

In using chromatography, no pre-knowledge whatever is required. The unknown solution can be chromatographed without any preliminary examination, and information on the complexity of the mixture is immediately forthcoming. An intensive chromatographic examination with several different adsorbents and solvents, will give a number of fractions, each in a fairly high state of purity, which can be used as the starting point for a chemical investigation.

This application, which may be regarded as an aid to organic preparative work, is closely allied to the use of chromatographic adsorption in chemical analysis. With easily characterised substances for which satisfactory analytical methods are available, there is nothing to be gained by using this technique, but in the examination of natural substances it can be of great value.

Such substances, which are frequently of rather indefinite chemical composition, give chromatograms which vary in a characteristic manner with materials from different sources. In tannin analysis, the source of the tannin can be traced from the appearance of the chromatogram. The identity of two substances can be tested quite easily in a chromatographic column: if a mixture of the two cannot be resolved with several different solvents there is a very high probability that they are identical.

Chromatographic adsorption provides a simple and rapid method of ascertaining whether a substance is a single chemical entity of a mixture. This is particularly useful in the examination of commercial dyestuffs, many of which are mixtures of two or more components.

Separation of Ionic Compounds

Most of the applications mentioned hitherto have been in the field of organic chemistry, the reason being that it is here that there has been the greatest need for a refined separation technique. Much work has been done in recent years, however, on inorganic chromatography and there is no doubt that increased interest will be shown in the future. Many ionic compounds can be separated on alumina columns but the procedure is less straightforward than with organic substances. Anions and cations become separated in the column by base-exchange with impurities invariably present, and therefore it is usually necessary to detect the anions and cations in two separate experiments. The precipitation of basic salts in the column must also be guarded against, by pre-treating the column with dilute acid. This introduces a further complication because the adsorption of any individual ion is very susceptible to changes of *p*H.

As relatively few ions are sufficiently highly coloured to manifest their presence in the chromatogram, chemical treatment of the column is necessary after the solution has been passed through it. Metals which form coloured sulphides can be revealed by treatment with a dilute solution of hydrogen sulphide. It is

usually possible to find some reagent which will give coloured products with metal ions, but the difficulties are much greater with anions and consequently their separation by chromatography has not been greatly developed.

When the field has been surveyed more systematically, it is not unlikely that comprehensive schemes will be drawn up for qualitative inorganic analysis which will replace some of the time-consuming chemical methods now in use.

Finally, although we are concerned here mainly with the applications of chromatography to research, a word should be said about the possible uses of the technique in industrial processes. Some successful work has been carried out on very large columns and there is no reason, in principle, why these methods should not be satisfactory for concentrating dilute solutions of valuable products or separating complex mixtures on a large scale.

Substances which have been examined chromatographically include alkaloids, amino acids, anti-biotics, butter, carcinogenic agents, carotenoid pigments, coffee, drugs, dyestuffs, fission products, foodstuffs, high polymers, hormones, inorganic ions, isotopes, liver extracts, metal ions, milk oils and fats, penicillin, petroleum hydrocarbons, plant pigments, proteins, rare earths, sugars, urine, vitamins.

Glass Production Efficiency

THE marked increase in the rate of productivity in industries since 1935 and 1937 finds further testimony in the current publication of Census of Production dated for 1948. The latest summaries (*The Board of Trade Journal*, 2797) relate to glass containers and glass other than containers. The value of production by the former industry in 1935, 1938 and 1948 (in £000) was £6584, £8201 and £20,765. The 67 factories operating in 1937 and 1948 employed only 4388 more in the latter year (23,874) than in 1948. The value of output per person rose in that period from £260 to £491.

The same trend is shown in the other glass category, which includes scientific glassware and optical glass. Its output rose from £7.8 millions in 1937 to £20.8 millions in 1948. Net output per worker rose in the same period from £261 to £533.

A provisional index of glass industry production in April this year, issude by the Central Statistical Office, stands at 138, compared with 135 in the first quarter of the year and 130, 122 and 107 in the three preceding years. The index figure for chemical and allied trades was 136 in April (123, 120 and 105 in 1949, '48 and '47).

INDUSTRIAL FINISHES

Enamel and Metal Coatings

THE importance of good finish whether of industrial machinery and equipment or of domestic ware is becoming increasingly recognised. Evidence of this will be provided by the first exhibition of Industrial Finishes to be held at Earls Court, London, at the end of this month.

Failure of finishes has been found by investigations of the Council of Industrial Design to be due more often to ignorance than to bad workmanship, although choice of finishes was frequently unduly influenced by cost.

Help for Production Planners

The council intends by its display to help designers and technicians to avoid pitfalls in the early planning stages of production. Mural displays of methods to be avoided or adopted from illustrations in the booklet " Design for Vitreous Enamelling," produced by Vitreous Enamellers Association (in collaboration with the council) will form a setting for sections of sheet and cast iron correctly and faultily fabricated to receive a vitreous enamel finish.

Among the items on view for the first time are a high quality coloured electro-brightening finish on die-castings and a high-temperature resisting vitreous enamel finish demonstrated on a gas cooker grid. Other displays on the stand include a vitreous enamel, free from lead, which can be applied to aluminium and a speculum plating on tin alloy which is particularly resistant to sea water and humidity.

U.S. Licences for Scottish Firms

SCOTTISH manufacturers who wish to manufacture American goods in Britain under licence have been offered the chance by the Scottish Council (Development & Industry).

A delegation of the council recently in the U.S.A. proposed a link-up between small manufacturers like that existing between many of the large concerns in both countries. The ECA authorities found some 70,000 manufacturers interested in such a scheme—which would open sterling markets at present barred because of dollar restrictions. The Scottish plan has thus been given ECA approval, with the proviso that all Marshall Aid countries should share in the scheme. The council is urging the earliest application for contacts with suitable U.S. firms in order to benefit by the granting of exclusive manufacturing rights for the sterling area.

OVERSEAS CHEMISTRY AND INDUSTRY

RISING FRENCH PRODUCTION

Acetone Equipment Installed

THE first report of the committee set up to examine the modernisation of the French chemical industry has just been published. It declares that France will have to re-equip the industry if foreign competition is to be met, and proposes that a sum of about £175 million should be invested by 1953.

One production aim is to make available 500,000 tons of nitrogen per year, about double the present production. French phosphate fertiliser needs are about 800,000 tons of P_2O_5. Yearly consumption is about 450,000 tons, but the report maintains that it will increase to 600,000 tons in 1953. It also supposes that France should be able to export about 160,000 tons.

Sulphuric acid needs in 1953 are estimated to be 1.77 million tons, of which 645,000 tons would be used in the artificial textile industry. Present production capacity is about 1.6 million tons.

The report also discusses plastic production in 1947, observing that it was only 6 per cent of the American output. While calling for a large increase in plastics production, the report gives warning against the production of low price, poor quality plastics.

More Sulphuric Acid

Official summaries of French chemical production during June disclose a considerable increase in production of sulphuric acid—95,000 tons against 88,000 tons in May. Fertiliser production was more or less at the same level as in May.

The French Société Naphthachimie's project for the production of 60,000 tons of naphtha per year as well as 10,000 tons of acetone and 17,000 tons of solvents and other chemicals, is almost completed. The plant will be working fully by 1952. Shell-St. Gobain also announces the installation of equipment for the production of from 10,000 to 12,000 tons of acetone from propylene, extracted from gas from its oil refineries. The technical research is now ended. The Compagnie Française de Raffinage-Ugine-Rhone-Poulenc has installed equipment for the production of from 10,000 tons to 12,000 tons of acetone from the same source.

Talks are now going on in France regarding the building of a carbon black plant with production from petrol by-products.

C

BRAZIL'S CHEMICAL PLANS

Soda Ash and Caustic Production

THE annual report of the Brazilian Government-controlled Cia. Nacional de Alcalis indicates that present plans provide for the erection of a plant in the Cabo Frio area with an annual capacity of 100,000 tons of calcium carbonate (instead of 50,000 tons as previously planned). This would result in an output of 45,000 tons of caustic soda, 33,000 tons of soda ash and smaller quantities of various by-products.

Growing Capital Needs

To obtain the proposed loan of U.S.$7.5 million from the Export-Import Bank, the company's capital was raised from Cr$50 million to Cr$100 million. The loan contract was not signed, however, and in the meantime further investigation has shown that the capital should be increased to Cr$150 million and that the amount of the proposed American loan should be increased to $10 million, to be used for the purchase of equipment abroad. The report emphasises that the carrying out of this project would bring about a substantial reduction of Brazil's imports of caustic soda and soda ash, which now amount to a value of Cr$200 and Cr$80 million respectively.

The Brazilian Congress is shortly to be asked to approve the granting of a Government guarantee for a loan of U.S.$35 million, to be requested from the International Bank for Reconstruction and Development by a Brazilian company for the exploitation of the Amapá manganese occurrences. The company is to be formed jointly by Indústria e Comércio de Minerios, S.A. (which has been awarded the concession and the Bethlehem Steel Corporation, the former contributing 51 per cent of the share capital and the latter 49 per cent. If present plans materialise, large-scale operations may be possible in 1952 or 1953, upon completion of the proposed railway linking the Amapá manganese deposits with the Amazon ports of Macapá and Santana. The initial annual production is estimated to be 300,000 tons.

Silver-Lead in Tasmania

A report from Montana Silver-Lead N.L., Zeehan, Tasmania, indicates that a considerable tonnage of ore, which the company will treat later, is being developed by contractors.

• OVERSEAS •

Ultrasonics for Concrete Testing in U.S.

Included in the equipment of a new cement research laboratory in the U.S. is a soniscope which, by means of fast sound waves, is used to measure the mechanical properties of concrete structures.

U.S. Tin Recovery

According to the U.S. Bureau of Mines, 3798 short tons of tin were recovered by U.S. de-tinning plants in 1949. Clippings and old cans yielded 3654 short tons, of which 3195 short tons was claimed as metal, and 459 short tons in the form of tin compounds.

Aluminium Plant for U.S.A.

A dismantled German aluminium plant, which used to produce primary aluminium in Bavaria, and was awarded to the U.S.A. by the inter-Allied reparation agency, is being offered for sale to United States buyers by the U.S. State Department. It has an estimated annual capacity of 18,000 metric tons of pig aluminium.

Chile's State Petroleum

All petroleum deposits in Chile have been made inalienable property of the State. Under a new law published last month in the Official Gazette, the functions and rights of exploiting and working all petroleum deposits and of refining and selling its by-products will be carried out by the newly established National Petroleum Company of Chile under the direction of the Corporacion de Fomento de la Produccion.

New Jugoslav Metallurgical Institute

A new metallurgical institute was opened on July 1, in Ljubljana, Jugoslavia. In addition to the usual research departments, it includes a smelting department for the experimental manufacture of different kinds of steel. Special attention is to be paid to the properties of alloys, including their resistance to chemicals.

Contract to Make the Hydrogen Bomb

The Du Pont de Nemours chemical company has been selected by the U.S. Atomic Energy Commission to design, construct, and operate new facilities for developing the hydrogen bomb, other atomic weapons or fuels potentially useful for power purposes. The company will receive only a token fee of one dollar and the Government will pay all costs. Du Pont built and operated the first atomic energy plant at Hanford, Washington, which ceased operation in 1946.

Chilean Nitrate Strike Ends

The strike at Maria Elena, which produces 25 per cent of Chile's nitrate, ended last week. Output lost by the strike which began on June 14 was estimated at 60,000 tons.

U.S. Aluminium Production

Output of primary aluminium in the U.S.A. in April totalled 58,024 short tons, which was slightly below that of March (58,747 tons). Stocks at the end of April increased from the March level of 11,628 tons to 13,637 tons.

French Oil Refinery Reconstruction

Reports from France indicate that reconstruction of the Merkwiller oil refinery near Pechelbronn, which was destroyed during the war, has almost been completed. The plant employs 2500 persons and last year's production totalled about 50,000 tons. It is expected that production for the current year will total 60,000 tons.

Queensland Coal Deposits

The Queensland State Government recently instigated a technical investigation of the coal deposits in Queensland. It was discovered that the State possesses a wide range of types of coal, including per-hydrous coals which develop coking properties at a lower maturity than British coals. In addition, these coals give a higher yield of oils and tars on carbonisation than do equivalently mature British coals.

Saudi Arabian Oil Figures

Crude oil production in Saudi Arabia during May amounted to 17.1 million barrels, an average of 550,911 barrels per day. This compares with a daily average of 502,159 barrels in May, 1949. Crude production in the first five months of this year totalled 71.6 million barrels against 77.6 million barrels in the same period of 1949.

Swiss Chemical Exports

Official Swiss trade returns record that exports of chemicals, pharmaceutical products and dyestuffs amounted in June to Swiss Fr. 40.6 million as compared with 42.2 in May. Exports of dyestuffs and indigo have shown a marked decline to S.Fr. 14.1 million from 17.9 million. Shipments of pharmaceuticals rose from S.Fr. 16.6 to 18.0 million. Exports of industrial chemicals rose slightly from S.Fr. 6.2 to 6.5 million, and perfumery shipments rose from S.Fr. 1.5 to 2.0 million.

The Chemist's Bookshelf

BORON TRIFLUORIDE AND ITS DERIVATIVES. H. S. Booth and D. R. Martin. 1949. New York: John Wiley & Sons, Inc. London: Chapman & Hall, Ltd. Pp. ix + 315. 40s.

During the past ten years boron trifluoride has found extensive use in many types of organic reactions because of its remarkable qualities as a catalyst; this has led to a vast number of commercial developments and an ever-increasing interest in the compound and its derivatives. For these reasons, therefore, the publication of a treatise on the subject is very welcome, the more so since the authors have presented their material in a lucid manner and have dealt comprehensively with every aspect.

Chapter 1 deals with the interesting historical development of boron trifluoride, and its preparation. The next three chapters delineate the physical and chemical properties of BF_3 and its co-ordinating power. Because it is the most avid compound yet known for accepting electrons there seem to be few chemical substances with which boron trifluoride will not react, though carbon monoxide is an important exception. The inert argon, at low temperatures and under pressure, yields no fewer than six addition compounds with it.

Chapter 4 also discusses the theoretical considerations of the character of the donor atoms in a section entitled "Generalisations on boron trifluoride co-ordination phenomena." The number of different atoms that donate electron pairs to the boron atom is, in fact, surprisingly small, in view of the great many co-ordination compounds formed. In this respect, the treatment at some length of the fluoroborates in chapter 5 is very useful, especially with regard to the section on diazonium fluoroborates, because these compounds afford a convenient means of introducing fluorine into the organic molecule.

Chapter 6, a long one (62 pages) is about one quarter of the textual matter, and deals with the catalytic applications of the boron trifluoride derivatives. That so much space is devoted to this topic is sufficient in itself to indicate the great variety of uses for boron trifluoride in the field of organic synthesis.

The last two chapters give a detailed treatment of the intricate analytical methods used in the detection and estimation of the boron trifluoride compounds and complexes, and discusses the practical handling of these materials. The book is well illustrated; there are many excellent tables and graphs, and the indexes are particularly fine. The text itself is very readable, though possibly a little uncritical, and the authors merit high praise for their inclusion of so much new material in this compact, good-looking and invaluable book.—P.M.

PHYSICAL METHODS IN CHEMICAL ANALYSIS, VOL. I. Edited by Walter G. Berl. 1950, New York: Academic Press, Inc. Pp. xiii + 664. $12.00.

This volume is in effect a series of advanced monographs on selected methods of instrumental analysis. They are written by recognised experts and are intended for the analytical chemist who has to use modern tools. In each case a sound theoretical approach is given, and the monograph then goes on to discuss in detail the practical use of the physical measurement involved and the modern instruments available. In many cases sufficient material is present to enable full use of the particular physical method without much further consultation of specialised literature.

Volume I is concerned with methods which involve the interaction of radiation with matter; in other words, those methods which make use of "light" of any wavelength from that of electrons up to the infra-red. In addition, the mass spectrometer is also considered.

The scope of the work is well indicated by considering the titles of the monographs: Absorption phenomena of X-rays and γ-rays: X-ray diffraction methods applied to powders and metals: X-ray diffraction applied to fibres: Electron diffraction: Spectrophotometry and colorimetry: Emission spectrography: Infra-red spectroscopy: Raman spectra: Polariscopic and polarimetric examination of materials by transmitted light: Refrac-

tive index measurement: Electron microscopy: Mass spectrometry.

The theoretical treatment which opens each monograph is developed to the stage at which all the necessary formulæ and working equations have been derived. The experimental discussion which follows considers modern apparatus and methods; sample treatment and the evaluation of results (wrongly called data!), once these have been obtained; the fields in which the method has been used, in which it has proved particularly useful, and in which it may be applied in the future. Sources of error, the limitations of the method and its accuracy also receive attention. Finally, full literature references are given, as well as a supplementary bibliography of material likely to be of use for familiarisation with the whole field.

Because instrumental methods of analysis have been most extensively developed in the U.S.A., it is to be expected that an advanced treatise of this type from an American source would contain an up-to-date and authoritative treatment of these modern tools and techniques. This expectation is fully realised. In addition, the reader cannot fail to be impressed by the size of the field, and the urgent necessity for monographs of precisely the type contained here. Apart from the intrinsic merit of each monograph, it is very satisfying to have so comprehensive a treatment of these different analytical techniques available under one cover. All analysts whose work involves the use of or dependence on analytical techniques will find it indispensable as a work of reference.—C.W.

PRACTICAL APPLICATIONS OF SPECTRUM ANALYSIS. Herbert Dingle. 1950. London: Chapman & Hall, Ltd. Pp. ix + 245. Plates XIX. 40s.

In this book Professor Dingle aims at presenting the fundamental principles of spectrography. In his opinion, and he has taught the use of the spectrograph for thirty years, quantitative analysis has not yet reached the stage where the methods available are worthy of inclusion in this basic survey. Consequently, the bulk of the book is concerned with the theoretical approach to spectroscopy and the application of the methods to qualitative analysis.

No attempt has been made to describe the most recent apparatus. The author is finally concerned to ensure that the reader will understand the principles sufficiently so as to make use of either simple or elaborate apparatus. It is expected that any competent worker thoroughly familiar with the content of the book should, by use of manufacturers' catalogues and similar information, be able to apply modern apparatus when and where necessary.

The first chapter deals with general principles and presents an elementary discussion of the theory of the production of spectra. In the second chapter, the relative advantages of arc flame, and spark spectra (and the methods of exciting these) are described. There is, in addition, a brief account of absorption spectra. The next two chapters discuss prism and grating spectrographs in general terms, no attempt being made to attach the text to any commercial instrument. A thorough grasp of these valuable chapters should enable the intelligent reader to appreciate the theory underlying the construction of the particular instrument which he is using, and the precautions necessary for its proper use.

Chapter 5 describes the most usual methods for the identification and measurement of the wavelength of spectral lines. Chapter 6 describes the general approach to qualitative analysis, preparation of the sample, choice of exciting agency, identification of the major and minor constituents, and general precautions to be taken. Chapter 7 considers individually the elements which lend themselves to spectrum analysis, including a list of the sensitive lines and the peculiar problems of identification of each element under various conditions.

Although the author does not believe that quantitative analysis is sufficiently advanced at present to receive an extensive treatment, he gives a short introductory account of the problems involved in the use of the spectrograph for this purpose, and mentions one or two of the approaches that have been made to this problem.

The text of the book occupies 130 pages and the remaining 115 pages contain a valuable series of tables. The principal tables are a list of iron arc lines, a list of *raies ultimes* arranged by elements, and a list of *raies ultimes* arranged in order of wavelength. These tables are referred to the plates chosen for illustration purposes.

The title of the book suggests that a very much wider field is covered than is actually the case. The book would be better described as dealing with the "fundamentals of qualitative spectrum analysis." As an introduction to the subject, with no direct reference to the practical instrumental details, it is valuable, and, probably no better introductory book could be recommended, providing a sound basis for more detailed work.—C.W.

Technical Publications

EVERY aspect of instrument technology comes within the scope of the Society of Instrument Technology which has grown rapidly in membership and activity since its inception nearly six years ago. This scope is reflected by the papers published in the current issue of its *Transactions* (Vol. 2, No. 1), which now becomes a quarterly publication. The four papers reproduced are: "Measurement of Short Time Intervals," K. J. Brimley; "The Telerecording of Thickness, Pressure, Flow and other Physical Quantities Using a Simple Electromagnetic Circuit," W. J. Clark; "Modern Permanent Magnets for Electrical Instruments," D. A. Oliver and D. Hadfield; and "Sources of Information Relating to Instruments," G. P. L. Williams.

* * *

INCREASING applications of magnetic technology are reflected in the wide range of equipment for separation, protection, purification, extraction, reclamation, etc., described in its latest publication (No. 117) by Rapid Magnetic Machines, Ltd., Birmingham.

* * *

METHODS of countering corrosion of iron and steelwork in corrosive waters, and preserving of laundry plant are among the main features in the latest issue of "Building Topics" (Vol. IV, No. 4), quarterly publication of Tretol, Ltd.

* * *

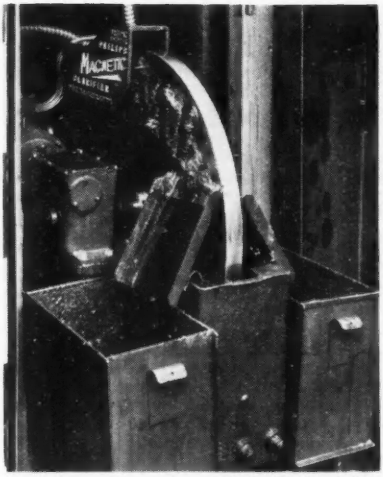
IN RESPONSE to the increasing interest shown, the "Code of Minimum Standards," drawn up by the Retread Manufacturers' Association, has been published in booklet form. The code was originally devised in 1948 as a domestic document to ensure a high standard of craftsmanship.

* * *

GUIDANCE on the design, fabrication and erection of arc welded structural steelwork is contained in its latest memorandum (T.26) now available from the British Welding Research Association.

* * *

TWO new fans for industrial use are described in its latest leaflets by Air Control Installations, Ltd., Ruislip, Middlesex. The Axelaire fan (F.A.503) is designed for extracting stale air, heat, steam, dust or vapours. The Windovent type (F.A.504), specially suitable for window fitting, is provided with a hinged outer cover which closes automatically when the fan is switched off.



[By courtesy of Philips Electrical, Ltd.

Efficient filtration of coolant and lubricating oils is a problem constantly under review in industry where the removal of bulk sludge is essential. This magnet clarifier, designed by Philips, removes not only the bulk sludge but also the smallest ferrous particles suspended in the coolant. The oxidising action due to the presence of such particles is reduced and a saving of coolant effected. Standard clarifiers can handle up to 500 gallons of lubricant or cooling fluid an hour

Aluminium Production in Australia

THE rising cost of rail and sea transport of Australian material may result in reduced use of locally mined aluminium ores. It may ultimately prove more profitable to import the higher grade bauxite ores from abroad.

This was a point made by the chairman of the Australian aluminium production commission in his recent annual report. The commission has suspended its survey of known bauxite deposits in Australia, pending the discovery of new deposits. Proved reserves under control of the commission total 8.6 million tons, of which 0.85 million tons are in Tasmania, and 7.75 million tons in New South Wales, principally in the Invernell and Emmaville districts.

· PERSONAL ·

THE following have been admitted as Fellows of the Institute of Chemisty of Ireland: Dr. A. G. G. Leonard; Mr. W. V. Griffiths; Mr. F. T. Riley; Dr. V. Barry; Mr. D. Crowley; Professor T. Dillon; Mr. D. T. Flood; Mr. G. F. O'Sullivan; Professor T. S. Wheeler; Dr. J. C. Aherne; Mr. J. G. Belton; Mr. S. M. de Bheal; Mr. F. J. Coll; Dr. G. Cruess-Callaghan; Mr. P. J. Hurley; Dr. J Keane; Mr. J. Kearns; Dr. A. E. Klingstedt; Dr. G. van der Lee; Mr. J. F. MacErlean; Mr. R. A. Molloy; Dr. B. J. O'Donoghue; Mr. H. L. O'Reilly; Mrs. E. M. Philbin; Professor W. N. Rae; Mr. G. A. C. Wilkin.

Of the four persons elected to fellowships of the Textile Institute three have earned distinction as chemists. Thev are MR. G. E. KEY, Ripley, Derbyshire, DR. L. A. LICHTENSTEIN, Whitchurch, Glam., and DR. H. F. MARK, Brooklyn, New York. Mr. Key, works chemist, Stevensons (Dyers), Ltd., Ambergate, has made substantial contributions to technical practice in connection with the fixation of dyestuffs on textile fibres; treatments to improve fastness to light of dyed materials, and improved methods of rot-proofing of textile materials. He is a part-time lecturer in textiles at Derby Technical College.

Dr. Lichtenstein, consulting chemist, Treforest Silk Printers, Pontypridd, has been responsible for patents relating to improved methods of dyeing and printing, and is the author of several papers and publications on the subject.

Dr. Mark, director and professor of organic chemistry, Institute of Polymer Research, Brooklyn, is the author of books on the properties of wool and on the physics and chemistry of cellulose. He has lectured to textile societies in England and the U.S.A.

The fourth new Fellow is MR. EDGAR ISLES, Halifax, executive director of the British Cotton and Wool Dyers' Association, an authority on slubbing dyeing.

DR. E. G. MALHERBE, principal of Natal University, has been elected president of the South African Association for the Advancement of Science.

The Pharmaceutical Society's research scholarship of £300 a year for two years has been awarded to MISS B. P. JACKSON, of Thorpe Bay. She will work in the museum of the society on genetical and cultivation investigations of vegetable drugs.

MR. A. D. BONHAM-CARTER is relinquishing the chairmanship of the soap-making firms, John Knight, Ltd., Silvertown, and T. H. Harris & Sons, Ltd., Stratford and Bow, to become head of the personnel division, Lever Brothers and Unilever, Ltd., Unilever House, London. He succeeds MR. H. H. BAGNALL, who has reached retirement age. The new chairman of John Knight, Ltd., and T. H. Harris & Sons, Ltd., will be MR. R. B. LOFTS.

At the recent annual general meeting of the Scientific Instrument Manufacturers' Association the following officers were elected for the year 1950-51:—President: MR. M. H. TAYLOR; vice-presidents: MR. J. E. C. BAILEY and MR. A. W. SMITH; hon. treasurer: MR. S. BORTHWICK; hon. secretary: MR. J. ROCK COOPER.

PROF. T. S. WHEELER, Department of Chemistry, University College, Dublin, is collecting information on the life of a distinguished Irish chemist, William Higgins (1763-1825), who was professor of chemistry to the Royal Dublin Society.

DR. E. W. R. STEACHIE, a leading atomic scientist and chemist, has been appointed by the Canadian Government as vice-president of the National Research Council to co-ordinate all research.

MR. PATRICK GALLAGHER, chairman and a founder of Gallagher Bros., Ltd., tallow melters, West End Chemical Works, Wigan, left £48,037 (net £47,949).

Obituary

DR. STEVAN RUZICKA, who advanced the use of rotary kilns in steel-making in the U.S.A., has died of a heart ailment in Washington, D.C., at the age of 61. He held a number of basic United States patents on wood coke and rotary-kiln processes for the making of high-grade steel direct from iron ores.

Visit to Steel Works

About 40 members of the North-Western branch of the Institution of Chemical Engineers visited the Staybrite Works of Firth-Vickers Stainless Steels, Ltd., recently. The party saw the centrifugal casting of heat-resisting steel alloys and the manufacture of pump impellers and other apparatus. Work-hardened materials were seen being returned to the annealing pits. Finally, the strip and sheet mill was visited.

HOME

Fines for River Pollution

Pest Control, Ltd., was fined £20 and ordered to pay 125 guineas costs on each of two summonses this week for causing pollution in the river Riddy, Cambridgeshire.

Eire and Austria Trade Agreement

Chemical and pharmaceutical exports from Austria to Ireland are included in the new trade agreement reported to have been initialled and awaiting final approval of both Governments.

Price Reduction

Evans Medical Supplies, Ltd., has announced that as a result of reduced costs and increased production the price of Heparin, the biological anticoagulant, has been reduced by 25 per cent. Stocks are ample.

Plastics Plant Explosion

One man was killed and another injured by an explosion at the central laboratory of Imperial Chemical Industries general chemicals division, Victoria Road, Widnes, an Monday last. Extensive damage was done to an experimental PTFE plant.

Mexican Trade Agreement

An agreement has been signed by the United Kingdom Government and the Government of Mexico which will allow the importation of Mexican commodities, chiefly raw cotton, worth about £4 million, in the year ending June 30, 1951, provided that normal agreement is reached between buyers and sellers on such questions as price and quality.

Chemical Society Research Fund

Applications for grants from the Chemical Society research fund will be considered in November next and should be submitted on the appropriate form not later than November 1, 1950. Applications from Fellows will receive prior consideration. Forms may be obtained from the general secretary, Burlington House, Piccadilly, London, W.1.

£2 m. for U.S. Pipelines

Dollars to the value of more than £2 million will be received for contracts which have been placed with Stewarts & Lloyds, Ltd., to supply steel pipelines to American petroleum and natural gas organisations. A large part of the work is for the Standard Oil Company, New Jersey, for which the Anglo-American Oil Company has acted as agents.

The Education of the Young Worker

The third conference on "The Education of the Young Worker" will be held at Magdalen College, Oxford, from August 12-18.

Brighton Congress

Brighton will be the location of the Textile Institute's next annual conference, to be held in May, 1951. Progress in important sections of the textile industry during the past century will be reviewed.

New Police Laboratory Planned

The establishment of a forensic science laboratory for the areas of Durham, Northumberland and Cumberland is being discussed by the Home Office and police forces of the three counties.

Laboratory Explosion

An explosion, thought to have been due to a blow-back in a retort, caused serious damage to a laboratory and workshop of Savory and Moore, Ltd., Tottenham, last week. The explosion occurred at lunchtime when only a skeleton staff was on duty, and no one was injured.

Payments to Scottish Pharmacists

The Pharmaceutical General Council has asked Scottish pharmacists to sign a mandate giving the council the right to announce the withdrawal of all chemists from the national health service if no satisfaction is obtained in the dispute with the Secretary of State for Scotland on the question of payments.

Agency to Cease

Business activities of the British Jeffrey-Diamond, Ltd., in South Wales are now being conducted from its own branch office at Dock Chambers, Bute Street, Cardiff (telephone 1070) with Mr. F. Jackson as district technical manager. The agency agreement with Llewellin and Evans and Major, Ltd., was terminated by mutual agreement on July 31.

Sea Water Bromine from Anglesey

The Associated Ethyl Co., Ltd., London, manufacturer of chemicals for petroleum industries, is sponsoring a new industry at Amlwch (Anglesey), a plant to extract bromine from sea water. The plant will take two years to erect and will then employ 120 men. The bromine produced will form part of the company's products for the oil industry, of considerable importance as exports.

ANTI-CORROSIVE PAINTS

Seawater Resistance Tests

RESULTS of tests on the formation of anti-corrosive compositions for ships' bottoms and underwater service on steel are given in the first report of Joint Technical Panel N/P.2, now available from the British Iron and Steel Research Association. The 68 anti-corrosive compositions tested comprised systematic variations of mixtures of basic lead sulphate, white lead, aluminium powder, Burntisland red and barytes. All pigmentations were duplicated in compositions bound, respectively, with a modified phenol formaldehyde/stand oil medium and a coumarone/stand oil medium. In addition, three of the pigmentations were bound with each of five other media, including chlorinated rubber, and media derived from the modified phenolformaldehyde/stand oil by the substitution of dehydrated castor oil or tung oil for part of the stand oil.

Accelerated laboratory tests, using the CRL high-speed rotor were conducted in collaboration by the Chemical Research Laboratory, Teddington, and the Admiralty Metallurgical Laboratory, Emsworth. Eight of the compositions were placed in the "very good" group, all of which appeared to be improvements even upon earlier formulations. The best performances were given by paints bound in chlorinated rubber, which confirmed earlier raft tests at Caernarvon. They were closely followed by a phenol formaldehyde/stand oil/tung oil medium.

Effectiveness of Streptomycin

SATISFACTORY results achieved by the use of streptomycin in the the treatment of tuberculous meningitis have been reported by the Ministry of Health in a recent issue of the *Lancet* reports that analysis of 369 proved cases, the largest yet collected in this country, showed after observation from 10 to 22 months, a recovery rate for the whole series of 28.6 per cent and for early cases as high as 49.3 per cent. Approximately nine out of 10 of the survivors were clinically fit and well. The 104 survivors were under observation for a further year, giving observations varying from 22 to 33 months. All were still alive and 88 were clinically fit and well.

This point was particularly emphasised in the report as "there appears to be a belief prevalent among many medical practitioners that streptomycin treatment does no more than prolong life or produce 'recovery' as a physical and mental wreck."

LETTER TO THE EDITOR

"Neglected Lime Producers"

I have read with interest the article under the above heading in your publication dated August 5, 1950, and in the main I am fully in agreement with what has been written therein.

It seems to me however, that you do less than justice to the Ministry of Agriculture when you state that "there has been no direct incentive to potential producers to make available more lime or limestone." During the war years the Agricultural Lime Department of the Ministry were very active indeed in encouraging the production of additional agricultural lime and limestone, and in fact subsidies were available towards the capital cost of installing additional plant, and many producers availed themselves of this financial assistance.

I think also, though this is merely an expression of opinion based on general knowledge, that by and large there is adequate production capacity in the country to meet the annual requirements of agricultural lime and limestone, and in addition, to provide a surplus towards overtaking the overall deficiency, so that within a reasonable period of years, t' position would be substantially rectified.

In my opinion the greatest needs are,

(a) that limestone producers should be assured as early as possible that the subsidy will be continued on a long term basis,

(b) that farmers should avail themselves fully of existing limestone supplies which are at present in excess of the demands on them,

(c) that supplies should as far as possible, be taken more evenly over the whole calendar year. (In the months of May, June and July the industry is almost at a standstill because farmers cannot, or will not, take supplies of limestone products in those months.)

In my experience, the permitted prices under the subsidy scheme are on the whole fair and reasonable, and I do not agree with the writer of your article that "a subsidy which was intended to encourage lime consumption in the national interest of land fertility has, in fact, discouraged production."

The production is, in the main, available although there may be certain parts of the country where additional supplies are required.—Yours, etc.,

HAROLD FLETCHER,
Assistant Managing Director.

Derbyshire Stone, Ltd.,
Matlock.

The Stock and Chemical Markets

THERE has been a firmer tendency in stock markets, and prices generally rallied moderately, led by British Funds, which were helped by the success of the Sierra Leone issue, although best levels have not been fully held. Uncertainty as to how and when additional taxation to pay for rearmament will be applied tended to keep industrial shares in the background, but there were numerous moderate gains, and a fair business was again reported in the steel and armament sections.

Chemical and kindred shares have reflected the better tendency in markets, although generally movements have been small. Further consideration of the good financial results and share bonus put British Glues 4s. units higher again at 25s. 9½d. Imperial Chemical strengthened to 41s. 3d., Monsanto were firmer at 48s. 6d. Laporte Chemicals 5s. units were 10s. 3d., Burt Boulton 26s. 6d., and Fisons 25s. 9d. Boake Roberts at 28s. 9d. have further responded to the past year's good profits. Albright & Wilson 5s. units at 29s. 6d. kept steady, the market awaiting news of the company's decision whether more capital is to be raised at this stage.

Brotherton 10s. shares remained at 20s., Bowman Chemical 4s. units were 5s. 3d., F. W. Berk 10s. 3d., Amber Chemicals 2s. shares 3s. and Lawes Chemical 10s. 3d. L. B. Holliday 4½ per cent preference were 19s. 6d. and British Chemical & Biologicals 4 per cent preference 19s. 6d. Woolley 4¾ per cent debentures were 104½ Pest Control 5s. shares eased to 6s. 9d.; the 5 per cent preference were 18s. 6d., at which there is a yield of over 5⅝ per cent.

Turner & Newall have firmed up to 80s. and United Molasses to 42s. 6d. The 4s. units of the Distillers Co. were 18s. 6d. and United Glass Bottle at 75s. were again a particularly firm feature. Triplex Glass at 23s. 9d. have rebounded in anticipation of the results, the market expecting good profits although still being doubtful if it will be decided to raise the dividend at this stage.

Glaxo Laboratories have eased to 45s. 9d., Boots Drug showed firmness at 47s. 6d. and Borax Consolidated deferred were 54s. 6d. British Xylonite at 72s. 6d. failed to recover from their recent reaction. De La Rue were firmer at 23s. 3d., British Industrial Plastics 2s. shares were 5s. 3d. and Kleemann 1s. shares 7s. 7½d. Lever & Unilever, after falling to close on 38s., have picked up to 39s., the market assuming that there will be preferential allotment terms for shareholders in any new issue. Lever N.V. improved to 39s. 3d.

Iron and steels were again prominent with further gains, although best levels were not always held. Dorman Long have risen further to 32s. 3d., Colvilles to 36s. 9d., John Summers to 31s. 1½d. and Guest Keen to 46s. 9d. Staveley were 78s. 3d. and Powell Duffryn 29s. 4½d.

Sangers receded a little to 21s. 9d. Beechams deferred showed steadiness at 12s. 6d. Griffiths Hughes were 21s. 6d. and British Drug Houses 5s. shares changed hands around 7s. Associated Cement at 82s. 6d. regained part of an earlier reaction. Paint shares were generally better, with Lewis Berger at 27s. 3d., Goodlass Wall 34s. and Pinchin Johnson 37s. 9d. Oils also reflected the improved trend of markets.

Market Reports

A STEADY trade has been maintained in most sections of the industrial chemicals market, the usual seasonal quietness being offset by a greater activity in contract business. Supplies in general appear to be adequate to meet the immediate pressure from the home consuming industries and to cover a good volume of overseas inquiry. Prices have moved within narrow limits and, with the exception of a higher price for glycerin, there have not been any changes of importance. The uncertain world conditions are widening the market for the coal tar products.

MANCHESTER.—Seasonal influences on the Manchester market for heavy chemical products during the past week have been strongly in evidence. There has been a fair contract movement of the alkalis and other leading products to home users, but it has not been so heavy as it was a month or so ago. New bookings have also been on a smaller scale. With the holiday season now passing its peak, however, a return to normal activity in the market may be looked for within the next few weeks. Shipments of chemicals to the Empire and other overseas outlets has been on a moderate level. Average sales have again been reported in the fertiliser section. In the tar products market the light distillates generally seem to be attracting most attention.

GLASGOW.—Business generally continues to improve in the Scottish heavy chemical market. Exports also show improvement.

Law and Company News

Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages or Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

ABARDALE MANUFACTURING CO., LTD., London, W., wax mfrs. (M., 12/8/50.) July 7, £6000 second deb., to Mrs. H. M. Leapman, Hove; general charge.

ABBEY PLATING WORKS, LTD., Wembley. (M., 12/8/59.) July 6, £2650 mort. and a further charge collaterally securing £2650 secured by above mort. until such sum has been reduced to £1150, to Westbourne Park Building Soc.; respectively charged on Rowland Avenue, Kenton, and land and buildings, Abbey Plating Works, Wycombe Road, Wembley. *£13,916. Oct. 14, 1948.

EVERSON MOULDINGS, LTD., London, E., plastic moulders. (M., 12/8/50.) July 7, deb., to A. Brooks, East Barnet, securing such sum as may at any time be due to the holder; general charge.

FIDELITY INSTRUMENT CO., LTD., London, S.W., scientific instrument mfrs., etc. (M., 12/8/50.) July 6, series of £3000 debs., present issue £2700; general charge (subject to etc.).

INDUSTRIAL CHEMICALS, LTD., London, W.C. (M., 12/8/50.) July 10, £500 debs., part of a series already reg. *Nil. July 22, 1949.

MANBRE & GARTON, LTD., London, W., mfrs. of brewing sugars, etc. (M., 12/8/50.) July 5, £50,000 deb. stock, part of an amount already reg. *£573,744. Mar. 24, 1949.

Company News

Morgan Crucible Co., Ltd.

Group profit of the Morgan Crucible Co., Ltd., for the year ended March 31, 1950, allowing for all charges but before tax, was £1,135,046 compared with £1,195,109 in the preceding year. A final ordinary dividend of 8¾ per cent enabled the payment again of 12½ per cent on the year.

Standard Chemical's Profits

The Standard Chemical Co., Ltd., Montreal, earned $940,473, during the year ended March 31, 1950, an increase of 66.7 per cent on 1949. Though selling prices were little increased, the dollar value of sales was the highest in the company's history. The net profit for the year was $685,213.

New Registrations

Chemurgy, Ltd.

Private company. (27,832). Capital £20,000. Harvesting and collection of seaweed, etc. Reg. office: 135 Buchanan Street, Glasgow.

Flygiene, Ltd.

Private company. (484,743). Capital £500. Manufacturers of insecticides, fumigants, chemicals, etc. Directors: L. Butler, S. R. Butler. Reg. office: 90 Queen Street, E.C.4.

Ferdix Rubber (London), Ltd.

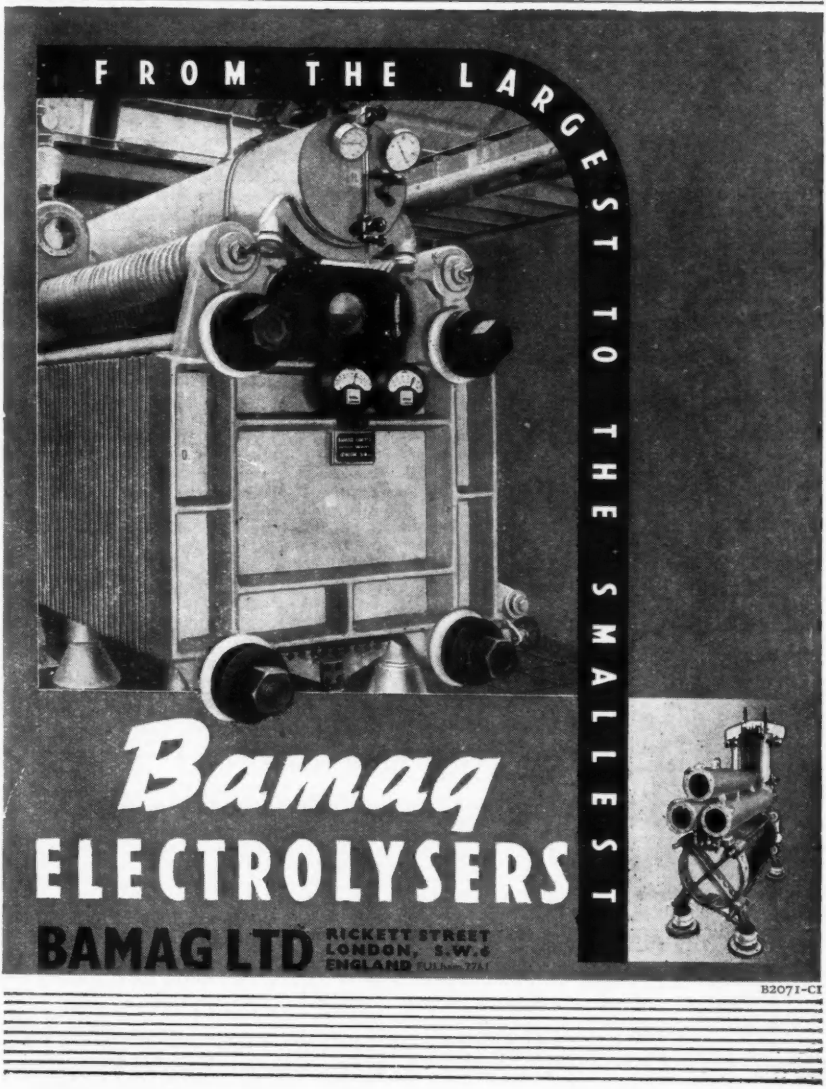
Private company. (484,004). Capital £100. Import and export of crude, synthetic and waste rubber, rubber chemicals, plastic and similar materials, etc. Reg. office: Bridgeway House, Hammersmith Bridge Road, W.6.

Paul Wormser & Co., Ltd.

Private company. (484,717). Capital £100. Manufacturers of heavy chemicals, etc. Reg. office: 203 Regent Street, W.1.

Swiss Chemical Exports

The value of chemicals, pharmaceuticals, dyestuffs and perfumery exported from Switzerland during the first six months of this year amounted (in million Swiss francs) to 238.7, compared with 239.9 and 264.5 in the first and second half, respectively, of 1949. The leading position is occupied by pharmaceuticals with 100.1 (93.2 and 103.1), followed closely by dyestuffs with 93.7 (100.4 and 111.8). Shipments of industrial chemicals totalled 34.6 (34.3 and 36.2) and of perfumery 10.3 (12.0 and 13.4).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Patent Processes in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted will be obtainable, as soon as printing arrangements permit, from the Patents Office, Southampton Buildings, London, W.C.2, at 2s. each. Higher priced photostat copies are generally available.

Process of purifying aromatic 1-hydroxy-2-acid amides by conversion into aromatic oxazine diones and reconversion of the said diones to purified amides.—General Aniline & Film Corporation. July 3 1947. 642,412.

Stabilisation of soap.—Monsanto Chemical Co. July 8 1947. 642,596.

Creep and corrosion resistant alloys.—Blaw-Knox Co. July 10 1947. 642,669.

Production of sulphonamides.—Monsanto Chemical Co. July 10 1947. 642,597.

Modified rosin esters and compositions containing them.—Montclair Research Corporation. July 21 1947. 642,414.

Vinyl halide polymers and copolymers and method of producing same.—B. F. Goodrich Co. July 22 1947. 642,415.

Diazotype compositions containing N-hydroxyethyl m-toluidine P-diazonium compounds.—General Aniline & Film Corporation. Sept. 19 1947. 642,422.

Butadiene copolymers.—H. K. Stephens, J. Downing and J. G. Drewitt. Nov. 19 1948. 642,606.

Containers for storing and dispensing liquefied gases.—British Oxygen Co., Ltd., and R. C. Godfrey. Nov. 9 1948. 642,438.

Process of recovering potassium from diluted solutions.—Norsk Hydro-Elektrisk Kvaelstof-Aktieselskab. Dec. 9 1947. 642,472.

Wax-coating compositions.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. Dec. 12 1947. 642,441.

Method of inhibiting polymerisation.—Mathieson Alkali Works. Jan. 26, 1948. 642,612.

Process for the manufacture of urethanes.—Beck, Koller, & Co. (England), Ltd. Feb. 5, 1948. 642,453.

Manufacture of carbon bisulphide.—Dow Chemical Co. Feb. 16, 1948. 642,557.

Process for obtaining an organic product containing nitrogen sulphur and oxygen and its application as a vulcanisation accelerator.—Soc. Anon. de Matieres Colorantes et Produits Chimiques Francolor. Feb. 26, 1948. 642,618.

Preparation of organo antimony derivatives.—Soc. Des Usines Chimiques Rhone-Poulenc. May 31, 1948. 642,457.

Process for the production of dimethyl silicon dichloride.—Dow Corning Corporation. June 16, 1948. 642,630.

Production of chlorbutyl esters of carboxylic acids.—British Celanese, Ltd. June 24, 1948. 642,489.

Organic oxidation reactions.—Imperial Chemical Industries, Ltd., and R. L. McGinty. June 20, 1949. 642,459.

Distillation of aluminium from aluminium alloys.—International Alloys, Ltd., and E. Scheuer. Aug. 2, 1949. 642,499.

Organic sulphur derivatives.—Ilford, Ltd., and H. D. Edwards. Sept. 14, 1949. 642,514.

Phosphors.—Marconi's Wireless Telegraph Co., Ltd. Nov. 14 1944. 642,701.

Method and apparatus for making a fabricated sheet of unspun fibres.—Fibre Products Laboratories, Inc. July 15 1946. 642,890.

Moisture-resistant coating and method of producing it.—Western Electric Co., Inc. Aug. 1 1946. 642,892.

Process for the production of sterols from oils, fats and fatty acids.—Severoceske Tukove Zavody (Drive Jiri Schicht) Narodni Podnik. Nov. 20 1946. 642,714.

Process for the manufacture of fatty acids of high melting point from waste fatty substances.—Severoceske Tukove Zavody (Drive Jiri Schicht) Narodni Podnik. Nov. 20 1946. 642,715.

Method for the extraction of nucleic acid.—M. A. E. Assada. Nov. 26 1946. 642,716.

Production of alumina.—Aluminium Laboratories, Ltd. Jan. 2 1947. 642,943.

Method of pyrogenetically treating a mixture of combustible and non-combustible material and a furnace therefor.—J. E. Greenwalt. Jan. 8 1947. 642,898.

Process for the esterification of fatty acids with low-molecular univalent alcohols.—Severoceske Tukove Zavody (Drive Jiri Schicht) Narodni Podnik. Jan. 16 1947. 642,718.

Glassy phosphate powder compositions and process of making the same.—Albright & Wilson, Ltd. Feb. 28 1947. 642,944.

Glassy phosphate powder compositions and process of making the same.—Albright & Wilson, Ltd. Feb. 28 1947. 642,945.

Gas analysers.—C. A. Parsons & Co., Ltd., and A. E. Martin. Jan. 28 1948. 642,725.

Manufacture of isopropyl alcohol.—Distillers Co., Ltd., J. Howlett, and W. L. Wood. April 1 1948. 642,905.

Process for the conversion to sulphur and/or sulphur dioxide of other sulphur compounds and catalysts therefor.—K. Williams. April 9 1947. 642,726.

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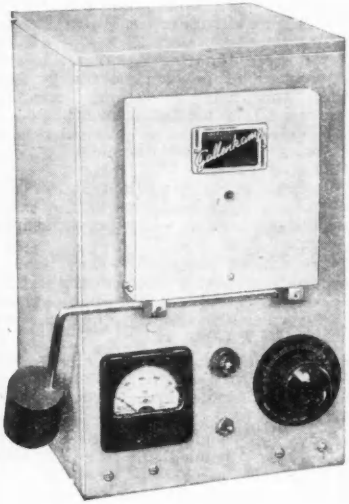

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Manufacture of moulded articles from materials containing cold-swelling starch.—Naamlooze Vennootschap W. A. Scholten's Chemische Fabrieken. April 14 1947. 642,906.

Method of removing chlorate substances from alkali metal hydroxides.—Diamond Alkali Co. April 15 1947. 642,946.

Sulfonated 1, 3-di (nitrophenyl) triazenes.—General Aniline & Film Corporation. April 16 1947. 642,947.

Process and apparatus for the cooling of molten lubricating greases.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. May 2 1946. 642,948.

Manufacture of coloured photographic layers.—Gevaert Photo-Producten N. V. May 13 1947. 642,728.

Process for preparing benzodioxane derivatives and the product resulting therefrom.—A. H. Stevens (Monsanto Chemical Co.) May 20 1947. 642,949.

Packages for use in liquid purification.—American Cyanamid Co. May 23 1947. 642,732.

Process for the preparation of alkanolamines.—Soc. Carbochimique Soc. Anon. June 25 1947. 642,950.

Processes of producing condensation products of phenols and processes of preserving rubber.—Monsanto Chemical Co. July 10 1947. 642,827.

Process for the removal of silica from an aqueous fluid.—American Cyanamid Co. July 30 1947. 642,951.

Soapless detergents mixed with triphosphates as builders.—Procter & Gamble Co. Aug. 1 1947. 642,921.

Luminescent materials.—Sylvania Electric Products, Inc. Aug. 5 1947. 642,742.

Convertable alkyl resins.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. Nov. 26 1947. 642,828.

Porous pots for primary electric cells.—India Rubber, Gutta Percha & Telegraph Works Co., Ltd., Hawley Products, Ltd., W. W. Puffet, and A. Lewin. Aug. 30 1948. 642,744.

Filter for purifying a liquid or gaseous fluid.—J. Depallens. Sept. 9 1947. 642,748.

Process for preparing reaction products of natural rubber or synthetic rubber-like materials with sulphur dioxide.—Rubber-Stichting. Oct. 3 1947. 642,959.

Lubricating composition.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. Oct. 6 1947. 642,960.

Infra-red gas analysing apparatus.—C. A. Parsons & Co., Ltd., and A. E. Martin. Oct. 6 1948. 642,750.

Continuous bleaching of glyceride oils.—Procter & Gamble Co. Oct. 16 1947. 642,751.

Method of producing pinacols.—White Laboratories, Inc. Oct. 24 1947. 642,752.

Process for the manufacture of olefine oxides.—R. S. Aries. Oct. 28 1947. 642,961.

Repeatedly ignitible composition rods.—F. K. Knutsson-Hall. Nov. 7 1947. 642,754.

Preparation of acetals.—General Aniline & Film Corporation. Dec. 8 1947. 642,830.

Process of brazing austenitic ferrous metals and articles produced thereby.—Ford Motor Co., Ltd. Dec. 18 1947. 642,768.

Stabilisation of tetrahydrofuran.—E. I. Du Pont De Nemours & Co. Dec. 19 1947. 642,969.

Refining of oils and motor fuels.—Refiners, Ltd., and T. Scott. Nov. 29 1948. 642,772.

Process for the production of a catalyst.—Spolek Pro Chemickou a Hutni Vyrobu, Narodni Podnik. Dec. 23 1947. 642,970.

Process for preparing metal powders for the purposes of powder metallurgy from copper and iron containing ores.—D. Primavesi. Dec. 29 1947. 642,773.

Nitriles and method of preparing same.—Resinous Products & Chemical Co. Jan. 1 1948. 642,930.

Apparatus for and method of applying protective coating material to the inside of a pipe or the like.—Dearborn Chemical Co. Jan. 8 1948. 642,777.

Production of potentially heat reactive thermo-setting resins and infusible resins and resinous products obtainable therefrom.—Harvel Research Corporation. Jan. 20 1948. 642,780.

Retardation of development of reversion flavour in hydrogenated fats and oils.—Procter & Gamble Co. Feb. 7 1948. 642,977.

Amides and their sulphonated derivatives.—Nopco Chemical Co. Feb. 13 1948. 642,836.

Manufacture of titanium pigments.—National Titanium Pigments, Ltd., J. T. Richmond, G. G. Durrant, and R. J. Wigginton. Dec. 15 1946. 642,979.

Process for printing or dyeing superpolyamide fibres.—Ciba, Ltd. Feb. 20 1948. 642,837.

Process and apparatus for the manufacture of fertilisers.—J. Balfour & Co., Ltd., J. H. Balfour, W. R. Normand, and A. M. Cameron. March 3 1949. 642,795.

Polymerisation of 4-vinylcyclohexene dioxide. — Canadian Industries, Ltd. March 24 1948. 642,799.

Polymeric 4-vinylcyclohexene dioxide.—Canadian Industries, Ltd. March 24 1948. 642,800.

Polymerisation of 4-vinylcyclohexene dioxide.—Canadian Industries, Ltd. April 14 1948. 642,983.

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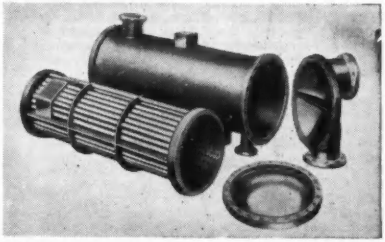

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Interviews from candidates offering qualifications in other subjects will be held throughout the remainder of the year, but a closing date for the receipt of applications earlier than December, 1950, may eventually be announced either for the competition as a whole or in one or more subjects.

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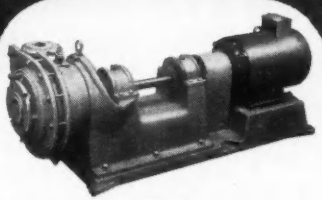

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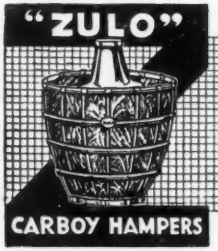

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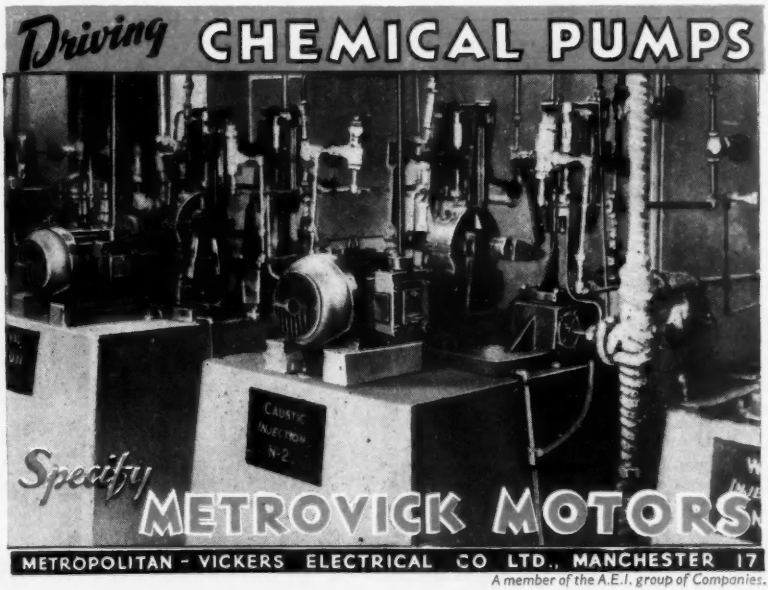

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